

COAL AGE

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THE DARE-DEVIL •

Written expressly for COAL AGE
By MICHAEL BERNARD



HE regarded with flagrant and mighty contempt
All the rules for his better protection,
And he smashed them to flinders whenever he dreamt

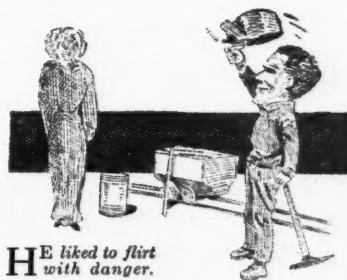
That his acts were not under inspection;
For he felt that a babyish care was displayed
In the way that the laws had been modeled,
And because he had long passed the infantile grade

He despised being pampered and coddled.

He was callous to pain and impassive to hurt,
While to fear he was absolute stranger,
And it added a zest to his labor to flirt
With the witching allurements of danger.
So he pulled out his pipe and he filled up the bowl
For a smoke, when the hankering seized him,
And he rammed down a charge in the depths of a hole
With the end of a drill if it pleased him.

He became very skillful in bouncing a trip,
For it saved him the trouble of tramping;
Setting safety aside, he continued to slip
Coal-dust into the holes he was tamping;
He persisted in keeping and carrying caps
Loosely thrown in the box with his powder;
And the fact that he missed any ugly mishaps
Made his dare-devil spirit grow prouder.

He had bragged to his fellows, again and again,
That his luckiness never forsook him,
But he trifled with fate once too often, and then
The expected result overtook him;
For he lifted a stretcher to hook up a mule
With whose temper he wasn't acquainted
And the angels foregathered to welcome the fool
To the blissful abode of the sainted.



Where Coöperation Is Most Essential

THE THREE WATCHWORDS OF PROGRESSIVE MINING ARE: *Safety First, First Aid and Co-operation. When we consider these slogans in their relative importance, we are reminded of the three Christian virtues, Faith, Hope and Charity, and in like manner we are moved to the conclusion that the greatest of these is co-operation.*

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The great importance of co-operation in first aid and safety first movements is quite apparent—forming as it does the very foundation of these life-preserving methods

We are being constantly reminded, also, how essential to a successful outcome is co-operation between mine superintendent, foreman, fireboss, and even to the man at the face.

This is all very good and true, but such an excellent rule as this should readily work up as well as down, and why shouldn't it be equally as important that the heartiest co-operation exist between the operating and sales departments of our large mining operations?

There is scarcely a mine superintendent today, but who could make some interesting remarks concerning the inconveniences frequently inflicted upon him through lack of harmony between the men "higher up." Furthermore, by reason of the subordination of his position to each of these men, he is obliged to change carefully worked out plans of procedure to suit the foibles of one or the other.

An incident of this nature occurred recently in a Southern coal and coke operation, which threatened to disrupt what was apparently a well-organized force of employees.

The sales manager upon receiving several complaints as to the quality of coke being furnished a contract customer, attempted to adjust matters by securing a number of samples of the coke in question; these he sent to the superintendent in charge of coke operations, with a request for an investigation and report.

The superintendent, in turn, submitted the samples to the chemist who informed him that he was under strict orders from the head of the operating department to do no work for the sales department without written orders from him.

When this information was reported to the sales manager, he became indignant over the curtailment of his authority in this direction and, rather than suffer the humiliation of asking for a permit to have the investigation made, came back with renewed vigor on the defenceless and ever-ready-to-please superintendent, demanding that the quality of the coke be improved.

The superintendent, in an effort to remedy the trouble without the aid of his chemist, used only certain coals for this coke and by so doing, threw completely out of balance the adopted system for charging the ovens, decreasing the yield, increasing the cost and placing himself in general disfavor with the operating manager.

After much parleying the old system was reinstated, the superintendent sternly disciplined and the contract eventually lost.

This may appear to be an extreme case, but it proves that the little green-eyed devils of jealousy and envy are not confined entirely to the underground workings of a coal mine, and that it is just as essential that they be abolished from the general office as from the plant itself, if complete success is to be attained.

One company of the Middle West overcame this difficulty by making the head of their sales department assistant to the head of the operating department. In this way they each realized how dependent the success of their respective departments was one upon the other. Each sought the other's counsel in all new enterprises and crises, and the harmonious effect was felt throughout the whole system.

Let the "get together" spirit prevail from the president's office down to the humblest trapper boy—then watch results.

Improving Colliery Surroundings in Anthracite Region

BY KARL B. LOHMANN*

SYNOPSIS—*There is no good reason why colliery plants should be blots on the surrounding landscape. By the aid of cleaning, painting, placement of paths, and the planting of shrubs and flowers, much can be done to reclaim the appearance of mining communities.*

It was not very many years ago when the mountains of the anthracite coal region were clothed in virgin timber and the streams that flowed along their valleys were clear and unpolluted. Our ancestors fished, hunted and lived amidst that undefiled natural scenery. Within the past half century, however, the aspect of the country has changed considerably. Villages, towns, cities have sprung up, and in them or near them the tremendous coal breakers tower in the air, looking out over sulphurous streams and desecrated landscape.

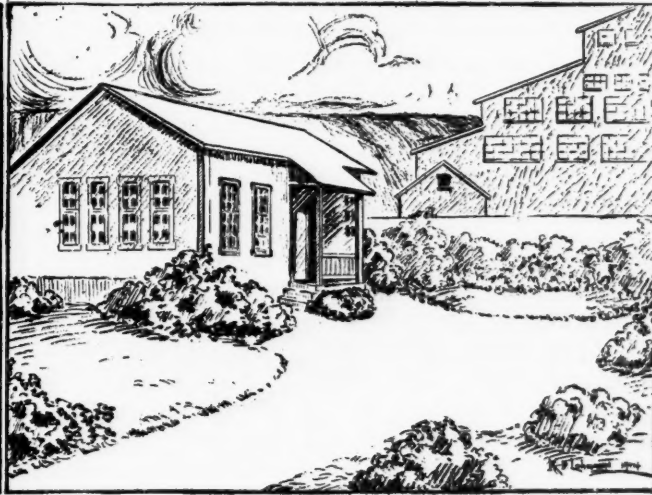
The damage brought about by the introduction of the coal breaker and its workings into the anthracite region is obvious, and the owners cannot help but feel their duty toward the community in the way of some reparation through reclaiming in part, at any rate, the surrounding landscape. This may do at least in the immediate vicinity of the mines.

Voluminous coal dust in connection with mine operation has been of great detriment to the communities, but lately the installment of dust-prevention systems has been a first step in the right direction toward the improvement of breaker surroundings. But in general the colliery yard remains sunbaked, bleak and unsightly.

The question comes up, therefore, how the hard-coal companies may restore unto the landscape and unto their own grounds, beauty and pleasantness of appearance, such



BEFORE IMPROVING



AFTER IMPROVING

The Susquehanna River is an example of this condition. As a result of the sulphur issuing from the mines, 50 miles of the most beautiful portion of this river has been bereft for the most part of its game fish. The once charming Lackawanna is another example, and now passes through the city of Scranton as a malodorous stream, and positive menace to the citizens of that municipality.

Not only has the sulphur been destructive, but deposits of coal in the river bottom have helped greatly to cause annual floods at Wilkes-Barre, Penn., that have wrought and still bring with them great destruction of property.

BLOTS ON THE LANDSCAPE

The landscape also has suffered. Cave-ins have become so common that one scarcely ever hears them talked of anymore. Here and there over the landscape one sees the bleak mountains of coal, which not only offend the eye, but are charged with great carbonic heat that renders it doubly uncomfortable for people in hot weather who live near them. Furthermore, they are easily windswept, at which times they cloud the air with coal dust.

*Landscape architect, Wilkes-Barre, Penn.

as is now being accomplished in other manufacturing industries throughout the country.

"RIDGING-UP" AND PAINTING

In the first place, there must be a general "ridding-up" of the grounds. Débris and all unnecessary refuse naturally must be removed and all of the surroundings of the buildings cleaned and put in order. After that is done, the buildings ought to be whitewashed where practicable, or given some neutral tone of coloring. The former seems most desirable around the mines, even though it would soon fall into disrepute perhaps among highly artistic circles. Whitewash seems to please the eye of the miner, either because it signifies cleanliness, or else beauty of contrast in its whiteness as opposed to the darkness amidst which he labors.

ROADS AND PATHS

After cleaning and painting up, the next step on the breaker grounds is the placement of paths and roads. This is important and is a provision which a large number of companies have unfortunately failed to consider. At first thought it is easy to understand just why they

have not. To see hundreds of different men crossing as many different imaginary paths it would seem impossible to provide for them definite ways of travel. But it is not impossible in the least. There are a few commonly traversed areas when one comes right down to the study of it, and if pathways were provided for these, they would contribute not only to the appearance of the colliery yard, the appearance of systematic orderliness, but also to the convenience, comfort and safety of the men.

As an example of the safety provision of paths, one might note the efforts that have been made at the Mineral Springs colliery, of the Lehigh Valley Coal Co., near Parsons, Penn. At that colliery the Lehigh Valley has expended a large amount of money to construct a wall and a path down over an incline just for the purpose of directing the stream of employees across one track instead of several, as before. A great deal could be accomplished in this problem of intelligent path and road construction with colliery yards.

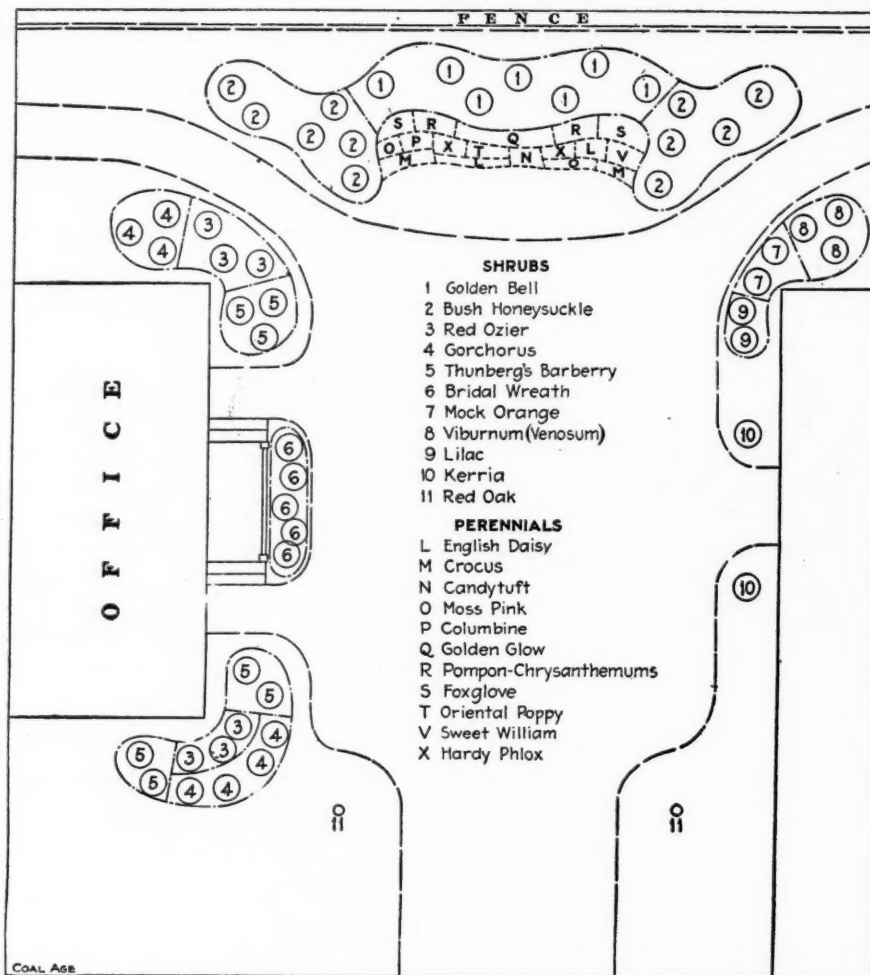
VEGETATION POSSIBILITIES

One of the most vital things to be done in the surroundings of the mines, the highest and the most important step of all from an æsthetic point at least, is the bringing in of vegetation. This is an undertaking which is now being attempted successfully. Here and there at various collieries, it is true, little patches of lawn and pathetic clumps of flowers have been tried with fear and trembling as if doubting the propriety of the undertaking. The Prospect and the Mineral Springs collieries, belonging to the Lehigh Valley Coal Co., have made the most extensive attempt of any, however, and in their efforts may settle for other collieries the appropriateness of landscape improvement.

"If placed in colliery yards, has the vegetation any chance of growing?" is a natural question that comes to most minds. I have seen little beds of flowers persisting even in the clouds of some of the dustiest breakers. With the new systems of dust prevention, therefore, there is no question whatsoever of the possibility for growing things. It will mean, of course, in many instances the using of a few loads of loam, to be mixed on the grounds with mine manure, all at little expense. It will mean but very little maintenance after once started if proper advice is followed in the choice of plants in general. And it will mean a world of difference in the appearance of all surroundings.

"Why will it mean just this?" someone has asked, and we answer by saying, that to bring vegetation into the colliery yard is to relate the yard to the surrounding landscape, from which it has been so long divorced. That may sound technical and difficult, but it signifies no more than the actual truth.

Furthermore, will not someone wonder if the flowers, shrubs, grass, etc., would be trampled down by the men? At the Prospect Colliery already mentioned, I found that there never had been the slightest trouble of this kind. Instead of trampling down the flowers, the employees have taken a tender pride in them. During idle moments of the day, when the miners were waiting between shifts, they often took care of the flowers and some of them have even brought plants from their own gardens. Also, the men are known to come before the hour of work just to be near these little grass plots and flowers, which form for them a pleasant rendezvous.



GENERAL SCHEME FOR BEAUTIFYING COLLIERY GROUNDS

PLANTING SHRUBS

When bringing in vegetation for planting, the first thing to do is to select the area where it is to be placed. It may be that shrubs will be wanted along the paths, perhaps a couple of trees here or one or two there. It may be that shrubs ought to be placed near the outlying structures. The arrangements of the breaker grounds are such that nature rather than geometrical forms ought to be followed where practical in the working out of the scheme. Let the shrubs hide the foundations of the outside property buildings, let them inclose areas of grass, bound paths, mark entrance-ways, and offer themselves purely for individual or collective beauty.

Granted that areas for vegetation have been chosen, the first step is to prepare the ground of those areas preparatory to the planting. If the soil is of a clay nature, then plowing, harrowing and manuring are necessary. If

the soil is made up of culm principally, then new soil will have to be used. The depth of ground thus needed will vary. For ordinary grass suitable around breaker grounds, not much depth of loam will be necessary, but for the areas where shrubs and flowers are to be placed, at least eighteen inches of good soil should be put in.

THE CHOICE OF PLANTS

After the soil has been put into condition, it is ready for the plants, most of which may be introduced either in the fall or in the spring of the year with equal success. Now, the question comes up about just what sort of vegetation should be used. In one or two of the breakers they have attempted to grow annuals of brightly shining colors. Somehow they seem pleasantly appropriate for the miner who emerges from the darkness. Yet why this kind of plant should always be grown to the entire exclusion of perennials and shrubs in breaker yards is simply a matter of habit and lack of knowledge in the use and possibilities of other materials.

In the first place, annuals, beautiful though they may be, require reseeding every year and their lease on life is comparatively short. Shrubs, for example, have body to them and display their beauties not only in the summer season, but in the winter as well, and present charm of color and of branching habit. Yet shrubs would not be a substitute altogether for annuals by any means. They have their own functions to perform.

Perennials, however, are flowers that offer untold beauties and advantages for use in breaker yards. They do not require reseeding every season like the annuals that are in such general use, but rather they continue to grow annually more and more beautiful and they are in bloom from early spring until late fall if intelligently chosen.

THE PLANTING OF CULM PILES

There is one part of the colliery property where vegetation should find valuable use and that is upon culm piles. Except where they are to be removed immediately there is no good reason why they should not be covered with vines and all sorts of plants, and, in some instances, good grass, as in the case of the Mineral Springs Colliery heretofore mentioned.

With little trouble and expense, a thin layer of loam is raked into the side of the culm bank. It is surprising what a small amount of soil is necessary for all kinds of plants to take root immediately. But in addition to the used loam, "pockets," or wooden boxes are filled with good earth and then planted with a few hundred Virginia creepers, black alders, etc., or almost anything else growing nearby in the wild. Moreover, if trees as well as shrubs be planted informally about the base of the culm pile, a magical change will be wrought in every desert mountain of black refuse that is so treated.

CONCLUSION

Therefore, it seems that by the aid of cleaning, painting, placement of paths and roads, and the planting of trees, shrubs and flowers, much can and has been done to reclaim the appearance of the mines and surroundings with a minimum amount of cost, while incidentally restoring values of abutting property and helping in the uplift of the men.

Here and there at different mines one will discover a mere piece of grass or bunch of flowers carefully nurtured

by a circle of miners. Who will fail to answer the call for more grass and more flowers? Who will deny for his community and for his men the best possible surroundings?

The day has arrived when the larger coal companies especially are exerting every effort for the betterment of colliery surroundings, from an ethical as well as practical standpoint. Their action in such direction is noteworthy, and the time is ripe when their broadening operations for improvement will include the feature of practical and æsthetical landscape architecture.

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Coroner's Inquest at Mulga Explosion

The report of the coroner's jury regarding the Mulga mine explosion is dated from Birmingham, Ala., Oct. 12, 1914, and is as follows:

Inquest over the remains of Ed King, C. R. Combell, John Zalemski, Bob Dupion, Joe Malcoskie, Willet Pilcoskie, John Krativick, white; Scott Garret, Warren Whatis, Hamp Swanson, Cory Howard, W. M. Long, Joe Bragdon, Bert Webster, Tom Mitchell and Sam Chatman, colored.

Caused by an Open Door

We, the jury duly impaneled by the coroner of Jefferson County, on the 12th day of October, 1914, to inquire into the cause of death of the above mentioned, who were killed at the Mulga mines, Mulga, Ala., on Oct. 5, 1914, having diligently investigated said cause, and having taken all the testimony obtainable, agree that the deceased came to their deaths by an explosion of gas at Mulga mines, Oct. 5, 1914, which occurred because the trap door in the eighth right heading was broken down and was not replaced for a period of approximately one hour. The air was short-circuited, causing an accumulation of gas in the eighth and ninth right headings and rooms. There were men working in these places with naked lights, and the accumulated gas coming in contact with the flame caused an explosion, which resulted in the death of the aforesaid parties.

Employees Broke Down Door

We find that the trap-door was knocked down by a carload of ties attached to an empty trip in charge of Ed Lee, colored, motorman, and Jackson Rodgers, colored, trip rider. This motorman, Lee, and trip rider, Rodgers, were not the motorman and rider who went into the eighth right heading regularly, but were only placing the carload of ties, which were for use in that entry. The trapper boy at the door on that heading wanted to open it, but the trip rider, Rodgers, told him he was not going through, so the boy need not bother to open the door. But Rodgers must have miscalculated the distance, as we find that the car of ties crashed into the door and broke it down, frame and all, thereby short-circuiting the air and depriving the said eighth and ninth headings of the necessary amount of ventilation to remove the gas which was being produced in said workings.

Company Censured for Failing to Act

Therefore, we, as jurors, consider that as the ventilation of said eighth and ninth headings was cut off and impaired, we condemn the action of the company officials for not taking proper precautionary measures to safeguard the lives of the workmen in said eighth and ninth headings by calling them out from the danger zone in said headings until such time as the circulation of the air was restored and was again such as to make it safe for the men to continue working in said eighth and ninth headings.

Therefore, in view of the foregoing verdict, we, as jurors, recommend that in all mines generating gas, overcasts be put in as soon as practicable, on all headings, and the use of trap-doors be discontinued as far as possible. We also recommend that when the air is short-circuited or the ventilation of any mines impaired so that there is danger to human life, the management call the men in said mines to a place of safety.

We also recommend that in all mines generating gas, the fire boss examine the working places so frequently that no more than three hours may elapse between the times when the place is examined and when the working man goes to work.

JOHN GUTHRIE, M. J. SHENLIN, WILLIAM MUIR, SAM BRODIE, JOE HOSKINS, JAMES LIDDELL, C. L. SPAIN, Coroner of Jefferson County.

Coal Prospecting

By J. F. K. BROWN*

SYNOPSIS—The opening of coal measures in a new country or one remote from railroad connections is accomplished only under difficulties. Although the first expense of the project may appear high, it is money well spent to provide abundant supplies of all kinds at the start, so that the work or any part of it may not be "hung up" for lack of some necessary fitting or appliance insignificant in itself.

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Herein is discussed only that part of prospecting which deals with the assembling of the plant and accessories necessary to commence operations. What is written and described is out of some years' experience in this class of work, in many out-of-the-way situations.

There are companies who take their prospecting seriously and go into details thoroughly. There are others who have the habit of ordering their men to carry out work miles from any operating base, with second-hand equipment. There are still others who only calculate the cost of the main pieces of equipment needed, forgetting that the sundry items in many cases come to at least half the amount paid for hoist, boiler, compressor, etc., if not to more.

This shows that there are several points which it is important to keep in mind, when such work is being considered. They are mainly never to use for prospecting any second-hand equipment. This should be kept in mind as more particularly referring to pumps. Secondly, insist that the list of material made out by you as necessary, be shipped exactly as you have ordered it, before you leave for the scene of operations. If the concern cannot afford to purchase what is required, or the ordering is hung up by an ignorant office staff, anxious to justify its existence by reducing expenses, then it were better that the work had never started.

The conditions to which the details entered into hereafter apply are considered somewhat exceptional for coal work, but any figures given must be taken as covering only this particular locality, since probably no two prospects are ever sufficiently alike to allow of exact comparisons.

It is, therefore, understood that all the prices given, hereafter, with the exception of figures on timber, that being native grown, are f.o.b. point of purchase. This will enable many young engineers to have a commencing point in their own calculations, and give some idea of the class and amount of material needed, and the expense thereof. The list is fairly complete, but estimated cost can be varied according as to whether bedrock prices, or hardware merchants' figures must be paid.

The area in question was held under an unlimited option, on which, however, a monthly rental of a fairly heavy character was payable, so time meant money. The mineral to be opened was coal, of a thickness at the outcrop of 10 ft., but dipping at an angle at the surface of at least 60 deg. A shaft was sunk on the coal, to be afterward used as a ventilation opening, which shaft was made almost the full height of the seam and of a width of 10 ft., coal being left on the foot wall. The water encountered averaged 100

gal. per minute, but in the spring and fall went as high as 150 gal.

The situation of the proposed mine was 10 long miles from the nearest railway station, with a heavy climb for at least seven miles over woods roads, which in the wet periods were impassable for a heavily loaded wagon. From the station the nearest foundry and machine shop was 10 hours' travel distant. In winter, communication was many times interrupted because of snow storms, up to ten days at a time.

Operations were commenced in the midst of thick timber of small second growth, and at the end of a hot summer. Good timber for mining or building work had to be hauled a distance of from two to five miles. Cordwood was cut on the ground, but coal was used as soon as the surface sinking was completed. The cordwood, cut and delivered at the boilers, cost \$3 per cord.

Wages were paid at the following rates per day:

Wages:			
General laborer	\$1.50	Machinist	\$2.20
Blacksmith	2.50	Firemen	1.75
Carpenter	2.50	Sinkers	2.50
Chief mechanic	3.20	Machine men	3.00
Chief sinker	4.00		

A sinking contractor wanted \$12 per foot for the shaft, 8x10 ft.; manway, 3x8 ft.; ladders and landings

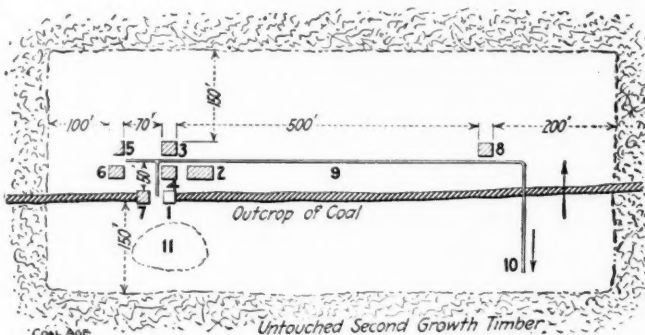


FIG. 1. PLAN OF OPERATION AND BUILDINGS

1. Shaft. 2. Compressor house. 3. Boiler house. 4. Hoist.
5. Forge. 6. Store. 7. Store (oil). 8. Magazine.
9. Fire lines. 10. Final outlet of pumped water.
11. Dump.

every 30 ft., timbering complete, he to pay timbermen and blacksmith, the company to provide all tools, timber, drills, power and explosives, and other material. The offer was refused, and the work carried out by day labor.

The prices paid for timber were as follows:

Boards	\$13 to \$14 per M. ft.
Heavy timber	12 to 14 per M. ft.
Shingles	1.75 per 1000

Hauling charges:	
Single buggy and driver	\$3.50 per day
Double buggy	4.00 per day
Double team hauling supplies	4.00 per day
Double team with two men	6.00 per day

The weight that could be hauled depended on the shape of the material, and the condition of the roads. There was one period when equipment and fittings were scattered along the roadside for several weeks, jettisoned, owing to a storm. The usual load would approximate 1200 lb. One of the boilers was hauled 16 miles in the dead of winter, having been consigned to the wrong station. It weighed three tons, and the time spent on the road was five

*Sydney, Nova Scotia, Can.

days, during which, progress the first day, was five miles, the second day, one mile, and the third day, one-quarter mile. On this last day 8 horses, half a dozen men, and a block and tackle were required. The cost of this particular item, including the men's meals and board on the road, was \$96, which worked out at \$2 per ton-mile.

A CAREFUL PLAN WAS MADE

As the work was expected to last some time, the ground was laid out to a plan shown in Fig. 1. The surface sloped from the buildings to the shaft. For a distance of roughly 150 to 200 ft. in all directions, the ground was cleared of all trees and shrubs, and a fire-fighting system laid out, operated from the pump. Two-inch pipes were used and nozzles provided near the blacksmith shop and boiler house, the roofs of which blazed up later on, on a number of occasions.

The buildings were erected at various times, and under all conditions of weather. A number were only finished by degrees, owing to the pressure of other work. Particulars were as follows:

Building	Size	Total Cost	Cost per Sq. Ft.
Compressor	24x17 ft.	\$186.95	46c.
Hoist	16x12 ft.	128.12	67c.
Boiler	18x12 ft.	86.40	40c.
Forge	16x12 ft.	79.34	41c.
Store	10x 9 ft.	64.95	72c.

Owing to the dip of the seam being in toward the hill and under the buildings, the headframe was specially designed and placed to allow of hoisting from a slope the grade of which might change. A type of headframe which has been used successfully in the Cobalt district, was decided on, and is shown in Fig. 2.

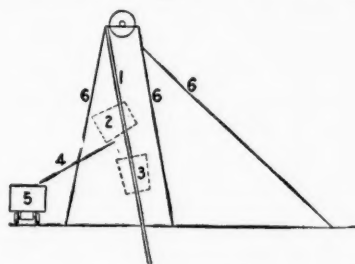


FIG. 2. DIAGRAM OF HEADFRAME
1. Guides. 2. Bucket. 3. Bucket. 4. Chute. 5. Car. 6. Headframe timbers.

place these guides cease, their place being taken by the outside runners, on which the horns of the bucket rest. On these runners, made of hardwood faced with iron strips, the horns move upward until they drop into the notch provided for them. Hoisting then ceases, the hoistman slacks out some rope, when the tub, lying at an angle of 60 deg., and suspended on the horns, which are well below the gravity point of the full bucket, turns sharply over and spills the contents into a chute. When empty the bucket is raised above the swing pieces fastened as shown to the side runners, and on lowering, the horns engage these side pieces, and turning them over, they form a bridge across the notch, over which the bucket slides down the runners and onto the regular guides. The swing pieces are pulled back into position by a wire spring.

This system operated quite satisfactorily, on almost all occasions, but once in a while the coal and dirt would jam in the mouth of the bucket, mainly through insufficient difference having been allowed in the width between the diameter at the bottom of the bucket, and the diameter at the mouth. On dark nights also, or when the wind was driving the steam around the buildings, it was difficult to see distinctly, and sometimes impossible to tell the exact position of the bucket, or when it was properly emptied.

In order to avoid this, the iron strips on the face of the runners were severed in two places with a saw cut, just above the tipping notch, and above the top of the swing pieces. These, as well as an iron rod at the collar of the shaft, were connected to a battery and bell of the single-stroke type. Further, a balance weight was used in the chute, onto which the bucket discharged.

When full, the bucket in turning over was heavy enough to press this down, but when empty, the balance weight forced it up. This was indicated by means of a slide in the engine room. Thus the engineer was made independent of any outside help in telling not only the position

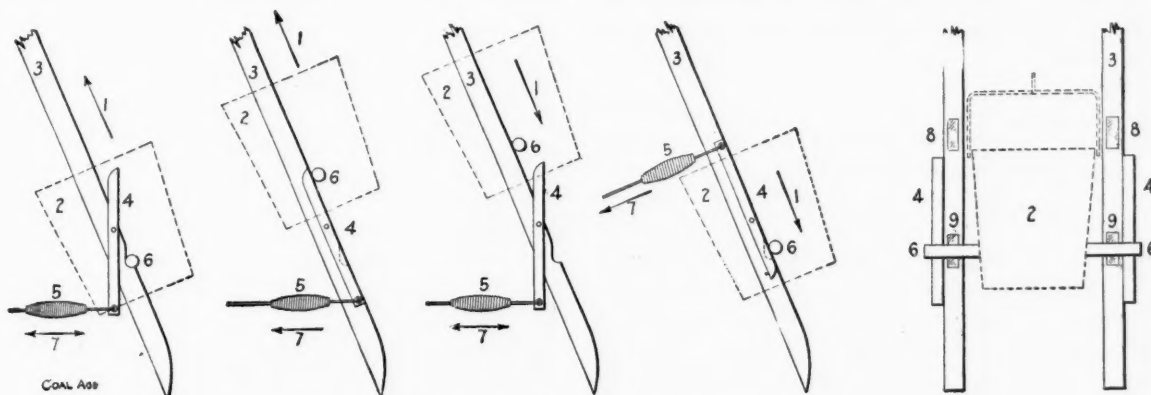


FIG. 3. THE USE OF TRIGGER AND COVERING PIECE

1. Arrows indicating direction of bucket travel. 2. Bucket. 3. Trigger. 4. Covering piece. 5. Spring attached to covering piece. 6. Horn of bucket. 7. Arrow indicating direction of tension. 8, 8. Plates connected by wire, which become electrically connected when horns of bucket pass over them, and so indicate position in engine room. 9, 9. Ditto, for position of bucket in turning notch.

A special kibble was also designed. The main object to be attained was automatic dumping in a simple fashion from a bucket which, at the same time, could be wound safely from either a vertical or inclined shaft. In the sketch, Fig. 3, the method of doing this is indicated. In hoisting the bucket slides on round timber guides of suitable length, but on coming near the landing

of the bucket, but also whether properly emptied or not.

The cost of the headframe, including timber, hauling, erection and pulley, amounted to \$230.19, distributed as follows:

Material	\$82.69
Haulage of material	15.00
Labor	132.50
Total	\$230.19

TWO DUMP CARS WERE BUILT

Two dump cars were built by the carpenter on the ground out of the remains of two originally sent out with the rest of the equipment. The original cars were so heavy and clumsy that a horse was needed to pull them, and furthermore, they were only box cars without any arrangement for dumping. On their arrival they were promptly burnt and out of the wreckage two small, self-dumping, full-circle cars were evolved that proved successful and easy to operate. They cost, including material and labor, a sum of \$43 each. This is, of course, more than they would have come to, had the proper car been sent up as ordered.

The plant consisted of two boilers, a hoist, an air compressor, two sinking buckets, two dump cars, one drill with column, two hammer drills and a sinking pump. The remainder of the material possibly comes under the head of supplies.

The boilers were two in number, described in the specifications as follows:

Two steam boilers of the inclined type, with water front, 40 hp., 44 in. diameter, 16 ft. long over all, with suitable dome 22 in. diameter, 27 in. high, firebox 6 ft. long, $\frac{3}{8}$ in. thick, shell $\frac{5}{8}$ in., and heads $\frac{3}{8}$ in., fitted with 61 tubes $2\frac{1}{2}$ in. diameter, 8 ft. long, No. 12 gage thick, and having the following fittings and fixtures of first-class quality: One 2-in. "Crosby" screwed safety valve, one $2\frac{1}{2}$ -in. nipple, one $2\frac{1}{2}$ -in. stop valve, one $2\frac{1}{2}$ -in. nipple, one "C" "Penberthy" injector 1 in., one check valve 1 in. properly piped and fitted, one blow-down valve $1\frac{1}{2}$ in., with nipples and elbow, one water column fitted and attached to boiler having steam gage, try cocks and drain cocks, tube cleaner and whistle with pipe and valve, wrought-steel front having water space and fitted with steel fire and ash doors, cast-iron grates, bearers, steel smoke box $\frac{3}{4}$ in. thick, with lined smoke doors, neck for funnel, and hand cleaning doors with fixtures.

One smoke funnel, 20 in. diameter, 30 ft. long, No. 14 gage thick, with bands on top, guy bands and 150 ft. of guy wire.

Each boiler is to be mounted on suitable axles with iron wheels, having flat iron spokes and broad tires, and is to be provided with a pole and fixtures.

Each boiler is to be carefully built by experienced workmen, for a safe working pressure of 125 lb. per sq.in., and tested with cold-water pressure to 200 lb.

Each boiler to be furnished complete with water gage, water-gage cocks, steam cocks, gage, safety valve, blow-off cock, injector, fire-bars, and stack and tools. The price paid complete at the purchase point to be \$725 each, or \$1450 for the two boilers.

Boilers for plants in out of the way situations, should be tested before leaving the works, and where two boilers are employed they should be of exactly the same size and capacity, and each powerful enough to give almost the full amount of steam needed. "Plenty of steam power, and to spare" is a good maxim. There is always some little thing that takes more steam than was calculated on, or the water supply goes bad, and pumping from some source a considerable distance away has to be resorted to.

The mine hoist was built for operation by compressed air or steam. It had double cylinders $6\frac{1}{2} \times 9$ in., also triple drums arranged in tandem, each 16 in. by 20 in. between flanges. Each drum was provided with a band-brake, friction gear and reversing-link motion all operated by levers in a quadrant at rear of frame between the cylinders. The capacity was 4000 lb., hoisted by each drum on a single line at 120 r.p.m. The floor space was 92×46 in., weight 4900 lb.

The price was \$610; extra for third drum, \$110, making total cost \$720.

It is always advisable to have a three-drum hoist. This is contrary to the usual practice, but an extra drum is a

very handy rig. One drum is in use hoisting, from the second hangs the pump, and a spare third is extremely useful for holding heavy timbers in position, hauling heavy material on the surface, or holding an extra bucket with tools, drills, etc., in the shaft, when ready to fire.

If at all possible, it is advisable to secure an upright compressor in two small units, not only for the sake of the less weight, but also for the size of the buildings and foundations needed. In the case under consideration however, a Canadian Rand compressor was installed, straight-line, 10-in. high- and 15-in., low-pressure steam cylinders, 10-in. air cylinders, stroke $15\frac{1}{2}$ in., air-pipe $2\frac{1}{2}$ in. to 3-in. main. The steam pipes were, admission $2\frac{1}{2}$ in., exhaust 5 in., steam pressure carried was 40 lb. Ten gallons of cooling water were required per minute. This machine was stated to be of 200 cu.ft. per min. capacity at 100 r.p.m. For transportation, the machine came in six large pieces, the weight of the heaviest being two tons. The price was \$3102.

THREE DRILLS WERE EMPLOYED

A Canadian Rand drill $2\frac{1}{2}$ in. and two "B. A. 26" butterfly flap-valve hammer drills were utilized. These have been priced as follows:

Drill, \$250; hammer drills, \$105 each, or \$210 for the two, making a total of \$460.

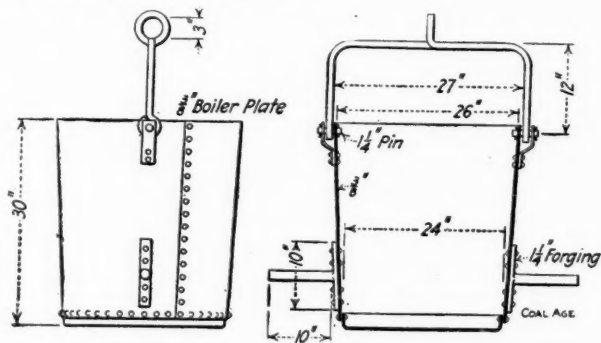


FIG. 4. DETAILS OF SINKING BUCKET

The principal precaution to be taken with such drills, and especially the hammer drills, is to keep moisture out of the air pipes in winter time. This freezes in the exhaust opening of the drills, the passages of which are not very large. Further the "B. A. 26" are hand-rotated machines, and for the type of sinking being described not well suited. The steels stick in the holes when withdrawing, and the whole operation is slow. A drill, machine rotated, capable of withdrawing its own steel, is much to be preferred.

One oil cup at the shaft collar forms a simple way of oiling any machinery operated by compressed air, but too much oil is just as bad as water. Usually this excess of oil is found coming over from the compressor. Frequently the backwoods engineer believes in oil (castor included) as a sure cure for all engine troubles.

An extra long column for the percussive drill is useful as a spare, especially when sinking a wide shaft. It is well to insist on having the steels intended for the drills, ordered from the makers, and not provided from a store by obstinate storekeepers, with the final necessity of having to have them attended to, or altered by a local blacksmith. It is advisable also to have valves at the top and bottom of the air columns, and in positions which are handy to get at. If there are three air branches at the

bottom, one to each of the drills, valves will be required on each.

At the top of the air main erect some simple form of oil and water separator, such as is shown in Fig. 6, and leave a space around it in which a fire can be built for heating purposes in winter. This is crude work, but it is just as well to be prepared for all sorts of "artful dodges" when in the woods prospecting.

THE PROPER TYPE OF PUMP IS IMPORTANT

The best type of pump for this work is probably a Cameron sinker, on account of both its simplicity and compactness. In this case, however, a Bawden sinker, size 7, was used and proved satisfactory. It is simpler than the Cameron in having no tappets internally, or outside valve-levers, and is positive in action. On the other hand, it is bulkier, and occupies more space in the shaft where space is a consideration: This pump was 10x5x7 in. and had a capacity of 100 gal. per min., weighed 2285 lb. and cost \$250.

When working with a sinking pump which is taxed to near its limit, a good plan is to arrange a small track in an inclined shaft, or guides in a vertical shaft, on which the pump can run easily, and hang it to the second hoisting rope. Double the hoisting rope over a "gin" to get the requisite lifting power if this is necessary. As a rule, a pump of this size can be operated readily either by steam or air, though some are better one way than the other.

If there is air to spare, it is advisable to use it, as in a shaft, work about a pump thus operated is much to be preferred. Standing on the hot steam chest with rubber boots, fighting with refractory connections is temper-trying work. The remarks made about air freezing in the drills are applicable to the pump. If the freezing is bad, a little paraffin oil in the feed cups works wonders. This should not be overdone.

BABBITT-COVERED PLUNGERS ARE ADVANTAGEOUS

In sinking in a coal seam, where the water is usually acid, the pump plunger should be built with a babbitt

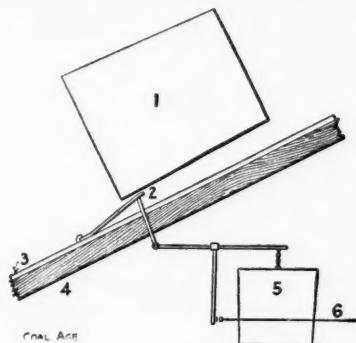


FIG. 5. DIAGRAM OF ARRANGEMENTS TO INDICATE FULL OR EMPTY BUCKET

1. Bucket falling over. 2. Projecting catch. 3. Sheet cover on chute. 4. Wooden floor of chute. 5. Counterweight to balance empty bucket. 6. Wire to hoist room.

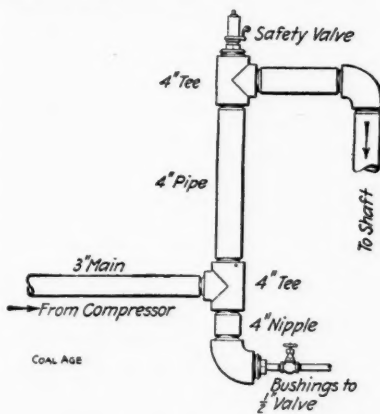


FIG. 6. THE OIL TRAP EMPLOYED

cover, as this is the best material to withstand bad water. Use hose connections, at least as long as a full pipe length on the discharge inlet, and if steam is used on the exhaust pipes, between the mains and the pump. Have valves at the ends of each of these pipe lines on the pump. Use unions which do not need gaskets, on all the connections which require changing frequently, and place these unions on the pipe, so that the ring catches from the top onto the part below.

It is easier to hold the end of a piece of pipe up and screw the ring over it downwards, than it is to raise the pipe, and attempt to screw upwards from the bottom position. Black oil should be used on all pipe connections, it is just as good as red lead or pipe-joint compound, and enables one to uncouple any pipe without trouble, which is especially handy in shaft work. In addition, on steam and exhaust, a drip arrangement should be provided at the pump. Nothing is more annoying than to have to stand on a hot pump and blow the accumulated condensed steam out of these two pipes, and besides there is always the possibility of the hose giving way, due to water pressure.

The use of hose allows the prompt insertion of another length of pipe, which is very useful where water is rising fast and further it gives the hoist man some little latitude as to his exact stopping point in lowering the pump, which it may be, owing to the position of the toothed grip on the side of the drum, is a bit above or below the exact position desired. It is well to leave the pump hanging on the rope attached to second drum. By this means, the pump may be lowered or raised in a minimum of time, and the water may be followed down, foot by foot, without stopping the working of the pump throughout the full length of the hose used.

Supplies have simply been tabulated at the actual prices, that is, catalog prices, less trade discounts:

PUMP FITTINGS

48 ft. water hose, 2 in., at 40c. per ft.	\$19.20
48 ft. steam hose, 1 in., at 43c. per ft.	20.64
48 ft. exhaust hose, 1 1/2 in., at 52c. per ft. ..	24.96
12 ft. suction hose, 2 1/2 in., at \$1.75 per ft. ..	21.00
1 foot valve, 2 1/2 in.	6.00
1 strainer, 2 1/2 in. pipe	9.00
1 valve, 2 in.	2.65
1 valve, 1 1/2 in.	1.75
1 valve, 1 in. ....	.90
	\$106.10

AIR-DRILL FITTINGS

2 lengths 20 ft. of 1-in. air hose, at 50c. per ft.	\$20.00
2 lengths 20 ft. of 2-in. air hose, at \$1.03 per ft.	41.20
6 1-in. steels, 12 in.	257 1/4 lb., at 8 1/4 c. per lb. 21.10
6 1-in. steels, 18 in.	
6 1-in. steels, 24 in.	
6 1-in. steels, 30 in.	
6 1-in. steels, 36 in.	
6 1-in. steels, 42 in.	
6 1-in. steels, 48 in.	40 1/2 lb., at 8c. per lb. 3.24
6 7/8-in. steels, 12 in.	
6 7/8-in. steels, 18 in.	
6 7/8-in. steels, 24 in.	
6 7/8-in. steels, 30 in.	
6 7/8-in. steels, 36 in.	
6 7/8-in. steels, 42 in.	2.00
1 key and wrench	
	\$87.84

HOISTING REQUIREMENTS

1 pulley, 3 ft. 6 in., cast with blocks for 3/4-in. rope	\$30.00
1 coil 3/4-in. wire rope, 300 ft., at 15c. per ft.	45.00
1 coil 3/4-in. wire rope, 300 ft., at 15c. per ft.	45.00
1 set blocks, single	2.00
And double with hooks for block and tackle	4.00
100 ft. of 1 in. dia. manila rope, at 20c. per lb.	8.00
2 cast-iron 12-in. pulleys for 3/4-in. rope groove, at \$10	20.00
2 self-dumping buckets, at \$23	46.00
2 thimbles for 3/4-in. rope, at 14c. ....	.28
12 rope clamps, at 40c.	4.80
1 "gin" block	10.00
	\$215.08

BOILER AND BOILER HOUSE

1 scraper for 4-ft. grate	\$5.00
1 poker	1.50
2 extra injectors, No. C.C. (Pen.), at \$20 each	40.00
3 doz. gage glasses, 18 in. long, 5/8 in. dia., at 81c. per doz.	2.43
1 spare pop safety valve, 2 in.	15.00

\$63.93

EXPLOSIVES

2000 lb. 40 per cent. dynamite, at \$13.20 per 100 lb.	\$264.00
1000 No. 8 electric detonators, at \$4.08 per 100	40.80
6000 ft. safety fuse, at \$5 per 1000 ft.	30.00
1000 No. 6 detonators, at \$1 per 100	10.00
1 battery, No. 2	13.50
1 thaw-pan	7.00

\$365.30

BLACKSMITH FITTINGS

1 portable forge, "Buffalo" type	\$37.00
1 anvil, 200 lb., at 9c. per lb.	18.00
1 set tools for anvil: Cross, dolly, sow top, bottom spreaders, top and bottom swages, 1 in. and 3/4 in.	3.00
1 pair tongs, straight tip, 16 in., at \$6 per doz.	.50
1 pair tongs, curved tip, 16 in., at \$8.50 per doz.	.70
1 pair tongs, pick up, 16 in., at \$6 per doz.	.50
2 striking hammers, 1/2 lb. and 1 lb., at \$12 per doz.	2.00
2 hand hammers, 1/2 lb. and 1 lb., at \$12 per doz.	2.00
1 6-in. jaw vise	22.00
1 pipe vise	14.00

\$99.70

GENERAL TOOLS

2 sets stocks and dies for pipe 1/4 in. up to 4 in.	\$28.00
1 set taps and dies for 1/4-in. to 1-in. stock	\$12.00
1 changeable ratchet for taper shank drills	16.00
Taper shank drills, 12 sizes, at 50c. each	6.00
1 set wrenches, 1-in., 3/4-in., 5/8-in., 3/8-in., 1/2-in.	1.00
2 10-in. Stillson wrenches, at 90c. each	1.80
2 13-in. Stillson wrenches, at \$1.60 each	3.20
2 24-in. Stillson wrenches, at \$2.40 each	4.80
2 36-in. Stillson wrenches, at \$4.80 each	9.60
2 10-in. monkey wrenches, at \$14 per doz.	2.33
1 doz. cold chisels, 6-in., at 38c. per lb.	.85
Pipe cutters, No. 1, 1/2 in. to 1 1/4 in.	3.00
Pipe cutters, No. 3, 1 in. to 3 in.	6.00
Pipe cutters, No. 4	14.00

\$169.58

GENERAL STORES

2 doz. ax heads and handles, at \$8 per doz.	\$16.00
2 doz. miners' picks, at \$13 per doz.	26.00
1 doz. clay picks	13.00
2 doz. round mouth shovels, at \$14.50 per doz.	29.00
3 doz. coal shovels, at \$14.50 per doz.	43.50
2 striking hammers, 5 lb., at 30c. per lb.	3.00
1 set hand steels, 7/8-in.	4.15
1 set hand steels, 12-in.	
1 set hand steels, 18-in.	
1 set hand steels, 24-in.	
1 set hand steels, 30-in.	
12 pails, at \$30 per gross	2.50
3 doz. stable lanterns, at \$10 per doz.	30.00
5 doz. globes, at \$1 per doz.	5.00
1 bbl. kerosene oil, 40 gal., at 19c. gal.	7.60
1 bbl. cylinder oil, 40 gal., at 60c. gal.	24.00
1 bbl. machine oil, 40 gal., at 28c. gal.	11.20
5 coils marlin	1.25
2 sq.yd. bluestone packing, 1/4-in., 10 lb. per sq.yd., at 90c. per lb.	18.00
2 sq.yd. bluestone packing, 1/8-in., 5 lb. per sq.yd., at 80c. per lb.	9.00
3 boxes spiral packing, 5/8-in.	8.10
3 boxes spiral packing, 1/2-in.	14.40
2 boxes flax packing, 5/8-in.	6.00
2 boxes flax packing, 1/2-in.	6.00
3 doz. 1/4-in. valves, at 38c. each	13.68
1/2 doz. 3/8-in. valves, at 38c. each	2.28
1/2 doz. 1/2-in. valves, at 50c. each	3.00
1 doz. 3/4-in. valves, at 63c. each	7.56
1 doz. 1-in. valves, at 90c. each	10.80
1 doz. 1 1/2-in. valves, at \$1.75 each	21.00
3 doz. 1 1/4-in. valves, at \$1.26 each	45.36
1 doz. 2-in. valves, at \$2.56 each	30.80
1 doz. 2 1/2-in. valves, at \$2.65 each	31.80
3 doz. 3-in. valves, at \$7.20 each	259.20
3 doz. 4-in. valves, at \$9 each	324.00
	\$1047.18
3 plain engine lubricators, No. 3, at \$2.10	\$6.30
3 glass body sight-feed lubricators, 1-pint size, single connection, at \$5.60	16.80
Iron body pressure gage, 5-in. dial	2.75
	\$25.85
500 ft. 1-in. pipe, at \$5.35 per 100 ft.	\$26.75
500 ft. 1 1/2-in. pipe, at \$8.60 per 100 ft.	43.00
60 ft. 1 1/4-in. pipe, at \$7.30 per 100 ft.	4.38
300 ft. 2-in. pipe, at \$11.65 per 100 ft.	34.95
300 ft. 2 1/2-in. pipe, at \$18.50 per 100 ft.	55.50
100 ft. 3-in. pipe, at \$24.50 per 100 ft.	24.50

100 ft. 4-in. pipe, at \$35 per 100 ft.	35.00
30 ft. 1/2-in. pipe, at \$3.05 per 100 ft.	.92
20 ft. 3/8-in. pipe, at \$2.60 per 100 ft.	.52
100 ft. 3/4-in. pipe, at \$3.60 per 100 ft.	3.60
3 1/2-in. unions, black, at 11c. each	.33
3 doz. 1-in. unions, black, at 16c. each	5.76
3 doz. 1 1/2-in. unions, black, at 29c. each	10.44
3 doz. 3/4-in. unions, black, at 13c. each	4.68
3 doz. 2-in. unions, black, at 37c. each	13.32
3 doz. 3/8-in. unions, black, at 10c. each	3.60
1 doz. 2 1/2-in. unions, black, at 77c. each	9.24
6 doz. 4-in. unions, black, at \$2.17 each	156.24
6 doz. 3-in. unions, black, at \$1.05 each	75.60
3 doz. 1-in. tees, at 8c. each	2.88
1 doz. 1 1/4-in. tees, at 12c. each	1.44
3 doz. 1 1/2-in. tees, at 15c. each	5.40
3 doz. 2-in. tees, at 20c. each	7.20
6 doz. 2 1/2-in. tees, at 36c. each	25.92
6 doz. 3-in. tees, at 55c. each	39.60
6 doz. 4-in. tees, at 87c. each	62.64
6 doz. 1/2-in. tees, at 5c. each	3.60
12 doz. 3/4-in. tees, at 6c. each	8.64
6 doz. 3/8-in. tees, at 4c. each	2.88
6 1/4-in. elbows, at 3c. each	.18
6 3/8-in. elbows, at 3c. each	.18
1 doz. 3/4-in. elbows, at 4c. each	.48
1 doz. 1/2-in. elbows, at 3c. each	.36
3 doz. 1-in. elbows, at 5c. each	1.80
6 doz. 1 1/4-in. elbows, at 8c. each	5.76
3 doz. 1 1/2-in. elbows, at 10c. each	3.60
3 doz. 2-in. elbows, at 14c. each	5.04
6 doz. 2 1/2-in. elbows, at 25c. each	18.00
6 doz. 3-in. elbows, at 37c. each	26.64
6 doz. 4-in. elbows, at 60c. each	43.20
6 1/4-in. couplings, at 2c. each	.12
12 3/8-in. couplings, at 3c. each	.36
12 1/2-in. couplings, at 5c. each	.60
12 1/2-in. couplings, at 3c. each	.36
48 1-in. couplings, at 6c. each	2.88
48 1 1/4-in. couplings, at 8c. each	3.84
48 1 1/2-in. couplings, at 10c. each	4.80
48 2-in. couplings, at 14c. each	6.72
24 2 1/2-in. couplings, at 20c. each	4.80
12 3-in. couplings, at 30c. each	3.60
12 4-in. couplings, at 50c. each	6.00

\$807.85

Bushings:

6, size 1/4, at 2c. each	\$0.12
6, size 3/8, at 2c. each	.12
6, size 1/2, at 2c. each	.12
6, size 3/4, at 2c. each	.12
2 doz. 1-in., at 3c. each	.72
1 doz. 1 1/4-in., at 3c. each	.36
2 doz. 1 1/2-in., at 5c. each	1.20
1 doz. 2-in., at 7c. each	.84
1/2 doz. 2 1/2-in., at 10c. each	.60
3 doz. 3-in., at 15c. each	5.40
3 doz. 4-in., at 25c. each	9.00
1 doz. 3 1/2-in., at 20c. each	2.40

\$21.00

Nipples:

	Close	Long	
6, 1/4-in., at 2c.	\$0.12	and 3c. each	\$0.18
6, 3/8-in., at 3c.	.18	and 3c. each	.18
6, 1/2-in., at 2c.	.12	and 3c. each	.18
6, 3/4-in., at 2c.	.12	and 3c. each	.18
1 doz. 1-in., at 4c.	.48	and 5c. each	.60
1 doz. 1 1/4-in., at 5c.	.60	and 6c. each	.72
2 doz. 1 1/2-in., at 6c.	1.44	and 8c. each	1.92
2 doz. 2-in., at 8c.	1.92	and 11c. each	2.64
1 doz. 2 1/2-in., at 16c.	1.92	and 24c. each	2.88
1/2 doz. 3-in., at 19c.	1.14	and 29c. each	1.75
1/2 doz. 4-in., at 34c.	1.02	and 48c. each	1.44

\$9.06

\$12.67

9.06

\$21.73

Rails, 2000 ft., 30 lb. to the yard, at \$2 per 100 lb.	\$400.00
Fishplates, 500 lb., at \$2.40 per 100 lb.	12.00
Rail spikes, 2000 lb., at \$2.90 per 100 lb.	58.00
3 kegs of 6-in. spikes, at \$2.60 per 100 lb.	7.80
3 kegs of 4-in. spikes, at \$2.75 per 100 lb.	8.25
5 kegs of 2-in. nails, at \$2.90 per 100 lb.	14.50
Track bolts, 300 lb., at \$5.25 per 100 lb.	15.75

\$516.30

Total general supplies..... \$3048.64

The above list may be long and cost much to provide, yet it is to be remembered, that it is much easier and more economical to have all that is likely to be required at hand, than to have to send to some far-off town for some material or article with the consequent loss of time, and money entailed in holding up the whole or any part of the work.

Finally, the total expenditure has been tabulated as follows, from which it appears that the price of the sundry articles comes to at least half the amount spent on what may be termed the plant proper:

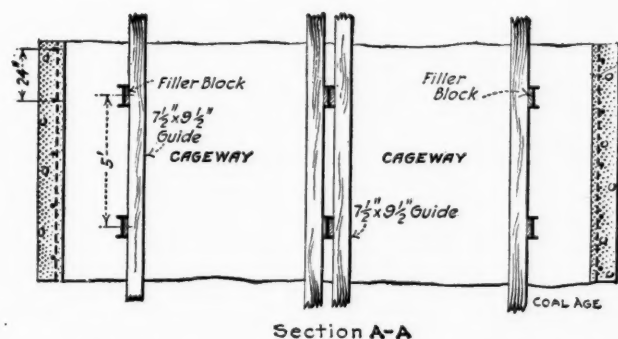
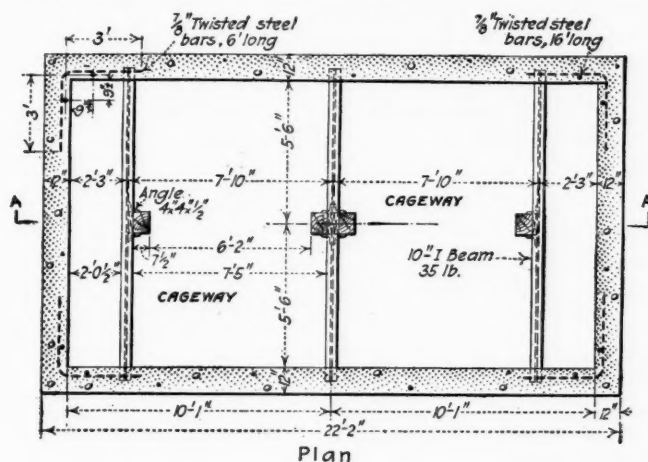
	Boiler	Hoist	Compressor	Head-frame	Pump	Drills	Stores	Total
Material	\$63.93			\$215.08	\$106.10	\$87.84	\$3680.40	\$4,153.35
Equipment	1450.00	\$720.00	\$3102.00	230.19	250.00	460.00		6,212.19
	\$1513.93	\$720.00	\$3102.00	\$445.27	\$356.10	\$547.84	\$3680.40	\$10,365.54

Concrete-Lined Shafts at the Bunsenville Mine

BY A. F. ALLARD*

SYNOPSIS—The machinery and other temporary equipment necessary for the sinking and concreting of two fireproof shafts are enumerated, together with the method of work employed during construction, and the progress made in sinking and placing the concrete shaft walls.

The Bunsen Coal Co., of Danville, Ill., has recently completed the construction of two fireproof concrete-lined shafts at its new Bunsenville mine, situated in Vermilion



FIGS. 1 AND 2. PLAN AND SECTION OF MAIN SHAFT

County, Ill., about three miles northwest of Georgetown. Both the main and auxiliary shafts are of rectangular design, and were sunk at a distance of 500 ft. apart. The entire work was carried on with the coal company's forces.

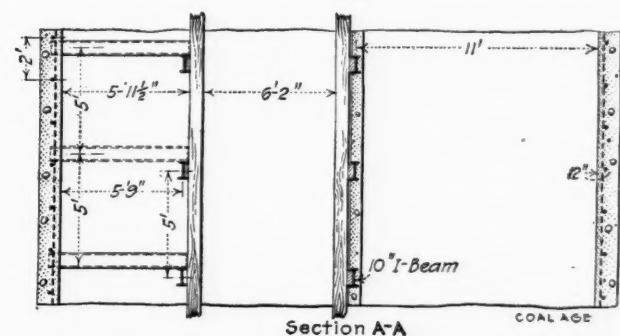
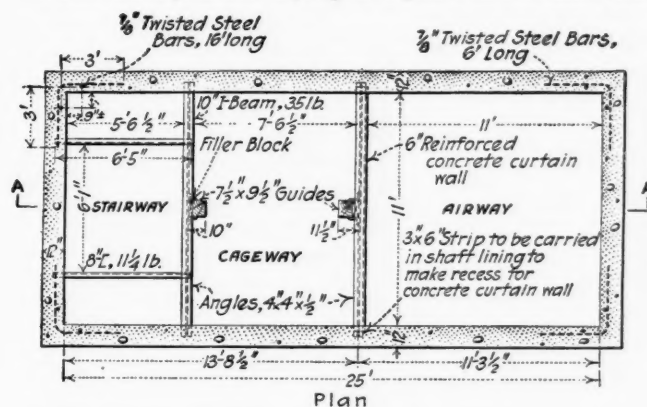
The method adopted in sinking, timbering and lining the shafts with concrete has been entirely successful. The sinking of both shafts to the bottom of the sumps was completed before any of the concrete lining was placed. The shafts were erected in connection with a new coal-mining plant, designed for the development of the unworked territory belonging to the Westville district. An area of 3000 acres of coal has been allotted to this mine, which when in full operation will supply an output of 4000 tons daily.

*Chief engineer, Bunsen Coal Co., Danville, Ill.

DESCRIPTION OF SHAFTS

Ground was broken for the main hoisting and auxiliary shafts on May 6, 1914. The main shaft is of rectangular design (see Fig. 1), measuring 20 ft. 2 in. by 11 ft. in the clear between concrete walls; it has a depth of 204 ft. from top of coping to the bottom of the No. 6 or Grape Creek coal seam, and is provided with a sump 21 ft. deep below the coal. This shaft is divided into four compartments, containing two cageways and one pipeway at either end. The clear opening area of 222 sq.ft. comprises 172 sq.ft. for the two cageways and 50 sq.ft. for the two pipeways.

From the top of the coping to a point in the solid rock,



FIGS. 3 AND 4. PLAN AND SECTION OF AUXILIARY OR AIR SHAFT

a distance of 89 ft., the concrete lining is 18 in. thick. From this point to the bottom of shaft the concrete walls have a thickness of 12 in. The walls in both shafts are of plain concrete except the corners, which are reinforced vertically, each with two lines of 7/8 in. by 16 ft. twisted steel bars, back of which are placed 7/8-in. by 6-ft. bars laid horizontally and spaced every 2 ft. for the entire depth of the shaft. No water rings are constructed in either shaft.

The top coping at each shaft has a thickness of 4 ft. at the surface, a width of 6 ft. at the base, and extends to a depth of 8 ft., forming a solid foundation for the support of the structural-steel headframe. The feature of a wide coping provides ample room inside of the coping fence to do repair work on the cages, etc.

The buntons supporting the cage guides in each shaft are all 10-in. I-beams weighing 35 lb. per ft.; they

extend into the concrete sidewalls 6 in., and are spaced 5 ft. center to center for the full depth of the shaft. The guides are all $7\frac{1}{2} \times 9\frac{1}{2}$ -in. by 30-ft. surfaced yellow pine, fastened at each buntion connection with two 1-in. bolts. White oak filler blocks are inserted between the web of I-beam and back of the guide giving a solid bearing.

Fig. 2 shows a section of the main shaft and the location of the buntions.

The auxiliary shaft is designed for combination hoist and ventilation. The hoist is for the purpose of handling material and the raising and lowering of men. The shaft is of rectangular design (see Fig. 3), measuring 25x11 ft. in the clear between concrete walls, and has a depth of 203

on the threaded ends. At the side of the guide and below each buntion, 6-in. heavy wrought-iron nipples are placed, provided with a plug screw cap for the purpose of arm holes to reach the nuts of the guide bolts at the back of the curtain wall. A space of $1\frac{1}{2}$ in. was left between the back of the guide and the face of the curtain wall to prevent transfer of vibration from the guide to the curtain wall.

Fig. 5 is a detail of the guide connection to the buntion

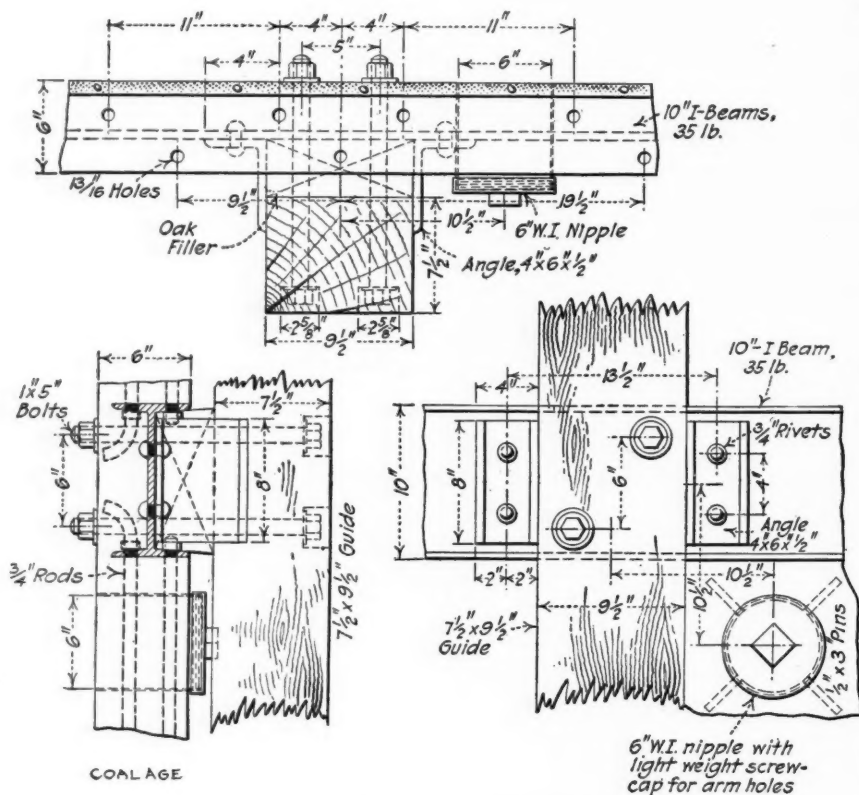


FIG. 5. DETAIL OF GUIDE CONNECTIONS TO BUNTIONS

ft. from top of coping to the bottom of coal. The sump has a depth of 12 ft. below the coal. This shaft is divided into three compartments, containing one cageway of same size as the main shaft, one airway and a stairway. The clear opening area of 275 sq.ft. is divided into 86 sq.ft. for the cageway, 121 sq.ft. for an airway and 68 sq.ft. for the stairway. From the top of coping to a point in the solid rock, a distance of 75 ft., the concrete lining is 18 in. thick; from this point to the bottom the walls are 12 in. thick. Fig. 4 shows a section of this shaft, the location of the concrete curtain wall in the airway and the I-beam buntions.

A CONCRETE CURTAIN WALL IS PROVIDED

The reinforced-concrete curtain wall separating the airway from the cage compartment was poured 7 in. thick and extends from top to bottom of the shaft. The reinforcement consists of plain $\frac{3}{4}$ -in. rods placed 9 in. center to center, staggered along the full flange length of the I-beam buntions. These rods are connected to the top and bottom flanges of the I-beams by means of nuts

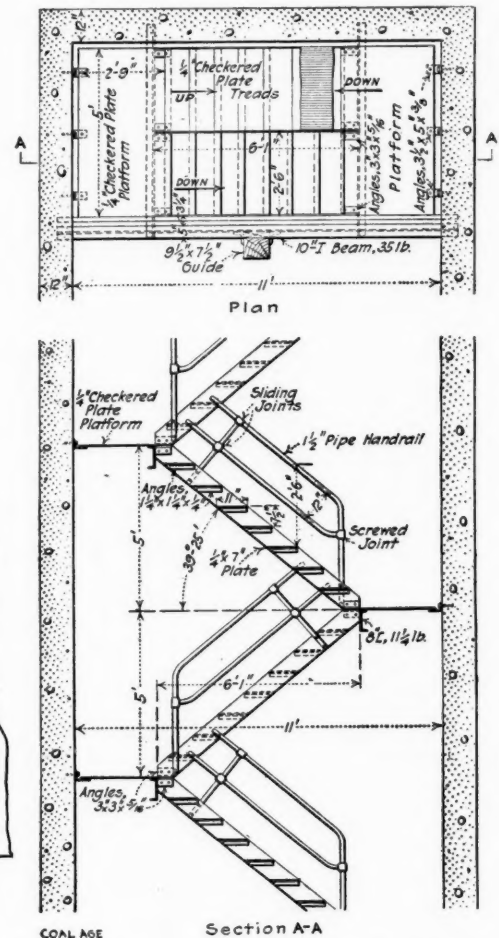


FIG. 6. PLAN AND SECTION OF STAIRWAY

along the curtain wall, and also shows the location of the arm holes. The addition of 4x6-in. angles at the sides of the guide to prevent vibration was omitted.

The steel stairways are of zigzag pattern, and, together with the landings, occupy a space longitudinally in the shaft for a width of 5 ft. 6 $\frac{1}{2}$ in. Each flight rises on a 39° 25' angle from the horizontal, and is 8 ft. long. The separate flights, including the landings, are supported on 8-in. channels weighing 11 $\frac{1}{4}$ lb. per foot, placed crosswise in the shaft, which in turn are supported at one end on the 10-in. I-beam buntions, while the other end is secured in the concrete end wall and has a bearing of 6 in. The channels are placed 2 ft. 5 $\frac{1}{2}$ in. from the side walls, and are spaced vertically 5 ft. apart center to center, alternating for each flight.

The stair stringers are $\frac{1}{4} \times 7$ in. deep. The treads are $\frac{1}{4} \times 11$ in. by 2 ft. 6 in., with checkered surfaces, and are supported on $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{4}$ -in. angles riveted to the stringers. The rise between treads is 7 $\frac{1}{2}$ in. The landing plates are $\frac{1}{4}$ in. by 2 ft. 9 in. by 5 ft., and are also checkered on the surface. Three lugs of $3\frac{1}{2} \times 5 \times \frac{3}{8}$ -in.

angle iron are riveted to the landing plate and fastened to the concrete wall by means of $\frac{5}{8}$ x5-in. expansion bolts well drawn up. The hand railings are made up of two lines of $1\frac{1}{2}$ -in. pipe; the uprights are bolted to the stair stringers and connected to each line of railing. The total weight per vertical foot of stairway and landings, not including the channel supports, is 100 lb. The stairway is easy for the men to walk on and is of economical design, as may be seen in Fig. 6, which shows the plan and part elevation.

WOODEN FORMS WERE EMPLOYED

The forms used for the concrete lining walls in each shaft were of the company's design, made and put together at the shaft site. A description of those used for the main shaft only will be given. The sides and ends were composed of $1\frac{1}{2}$ x10-in. tongued-and-grooved yellow

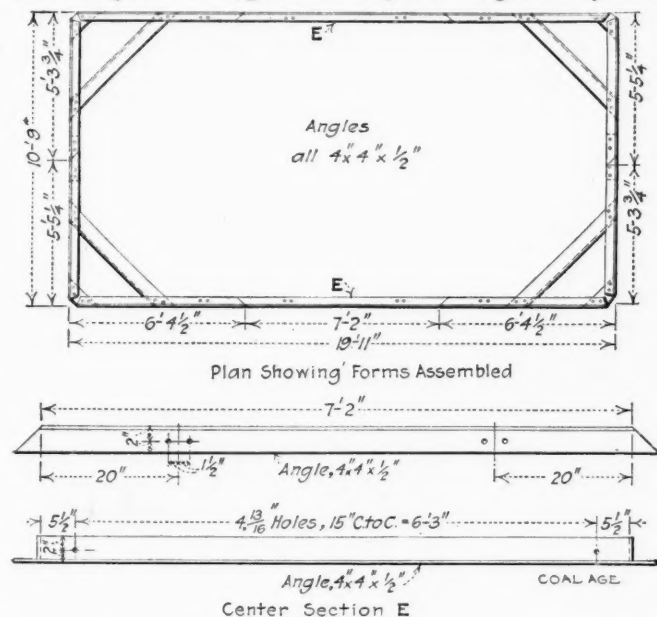


FIG. 7. STEEL FRAME USED FOR STIFFENING FORMS IN MAIN SHAFT

pine boards, surfaced on both sides, and cut into lengths making the section $2\frac{1}{2}$ ft. high. Nailing strips $1\frac{1}{2}$ x12 in. extended around the top and $1\frac{1}{2}$ x4 in. placed at the bottom formed cleats for the several units and held the matched boards securely in place. The top piece extended a distance of 1 in. above the top of the form on the inside for the reception of the next form section.

For stiffening the forms and supporting the concrete until it should set, a steel frame consisting of 4 x 4 x $\frac{1}{2}$ -in. angles was placed midway of each section and attached to the form boards by means of $\frac{3}{4}$ -in. bolts spaced 13 in. center to center around the entire section. The steel framework was stiffened at the corners with 4 x 4 x $\frac{1}{2}$ -in. angle bracing; while $\frac{3}{8}$ -in. splice and gusset plates were used for bolting together the several units composing the frame.

To insure easy removal of the forms and to increase the thickness of the walls, the corner pieces were cut on a 45° angle with a 5-in. bevel face. The vertical edges of each unit, including the forms and angle frames, were also cut on a 45° bevel, while 6x10-in. pockets were made in the top of every other form for the reception of the 10-in. I-beam buntions which are placed vertically 5 ft. center to center. The completed $2\frac{1}{2}$ -ft. section, including the

steel frame, weighed 2080 lb., and the heaviest unit 400 lb.

Fig. 7 shows the design of the steel frame used for the forms at the main shaft, and Fig. 8 that of the forms for the ventilating shaft. The latter provides for the construction of a reinforced-concrete curtain wall for separating the cageway from the air compartment.

A new feature in the construction of a sump was inaugurated at the bottom of the main shaft. The lining walls and the floor are of concrete 12 in. thick, with a sump well 4 ft. wide, extending the full width of the shaft, placed at the low end to catch all seepage water. This provides ample room for a pump suction line. The sump is of sufficient depth below the cage landing to permit a standard mine car to be run under either of the cage landings. They may here be loaded by gravity with the coal droppings from the dump or mine cars, accumulating in the storage hoppers placed under each landing.

A heavy steel sliding gate is placed at the bottom of each hopper which is operated by means of a hand chain and wheel placed at the side of the sump. When the mine car is filled it may be conveyed by motor through a concrete-lined tunnel which leads from the end of the sump up a sharp incline to the haulage road.

A reinforced-concrete floor extends over the sump to support the cage landers and for additional strength to

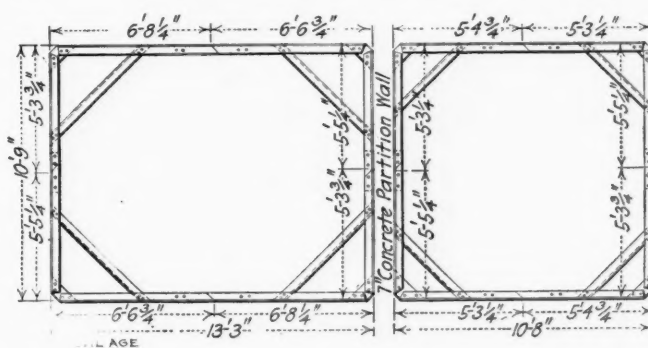


FIG. 8. STEEL FRAME USED IN FORMS FOR AUXILIARY SHAFT

absorb the shock of the cages striking the bottom landers. Heavy 24-in. I-beams are placed in the concrete floor and extend across the sump and are anchored into the lining walls.

Fig. 9 shows two vertical cross-sections of the sump. This design and the method of handling the waste eliminates the continual labor necessary to clean out by hand a deep sump, which not only is a source of annoyance to the pit boss, but a large expense annually to the coal company.

ARCHES ARE PLACED IN THE SHAFT APPROACHES

The approaches leading to the main shaft bottom from both the loaded and empty sides are of concrete. These are of 18-ft. 2-in. span, having a minimum thickness of 24 in. for the sidewalls and crowns. Each arch extends 12 ft. from the face to the shaft lining. An arch of 8-ft. span having a minimum thickness of 18 in. and extending a distance of 12 ft. from face of the shaft lining will be later erected. This arch will connect with a cross-entry and manway around the shaft bottom. An archway of 4-ft. span will be placed in the sidewalls for entrance to the run-around.

At the intersection of all arches with the shaft lining

wall, steel bars were placed for reinforcement. The centering for the large arches was built of 2-in. plank spaced 17 in. center to center, covered with 1x4-in. boards laid close together. Concreting of all the large arches was brought up at one time coincident with the shaft lining walls. Fig. 10 shows the plan and sections of the arches and the method of placing the reinforcement.

In the ventilating shaft the concrete arch approach leading to the shaft bottom from the caging side is of 10 ft. 4 in. span. The arch leading away from the air compartment is of 17 ft. 6 in. span. Both arches have a minimum thickness of 18 in. for the sidewalls and crowns and extend a distance of 12 ft. from the face of the shaft lining. Fig. 11 shows the arch plan and a section through the airway arch.

TEMPORARY PLANT

The plant used for the sinking and construction of the shafts consisted of three 50-hp. Pennsylvania economic boilers, return-tubular type, and one 40-hp. unit of

of 11 cu.ft. was placed at the top of each shaft. For handling muck, steel shaft-sinking turnover dump buckets, 36 in. in diameter and 36 in. deep, were used. These were replaced later with 3x3x3-ft. wooden boxes, made of 2-in. pine boards bound together with steel straps and provided with an end gate for dumping.

For taking care of the shaft water, two No. 9 Cameron regular pattern horizontal piston pumps were provided. These, however, were found unnecessary, as the water encountered at no time exceeded 5 gal. per minute. One $7\frac{1}{2}$ x5x10-in. piston pump was used at intervals for removing the water at each shaft.

For temporary ventilation required in driving the bottom landings, there will be placed at the main shaft one 2-ft. double-inlet fan, with a capacity of 15,000 cu.ft. per minute, driven by a 7x7-in. vertical engine. At the air shaft the fan will be a 3-ft. double-inlet machine with a capacity of 25,000 cu.ft. per minute, driven by an 8x8-in. vertical engine.

Revolving dump cars of 2 cu.yd. capacity for 36-in.

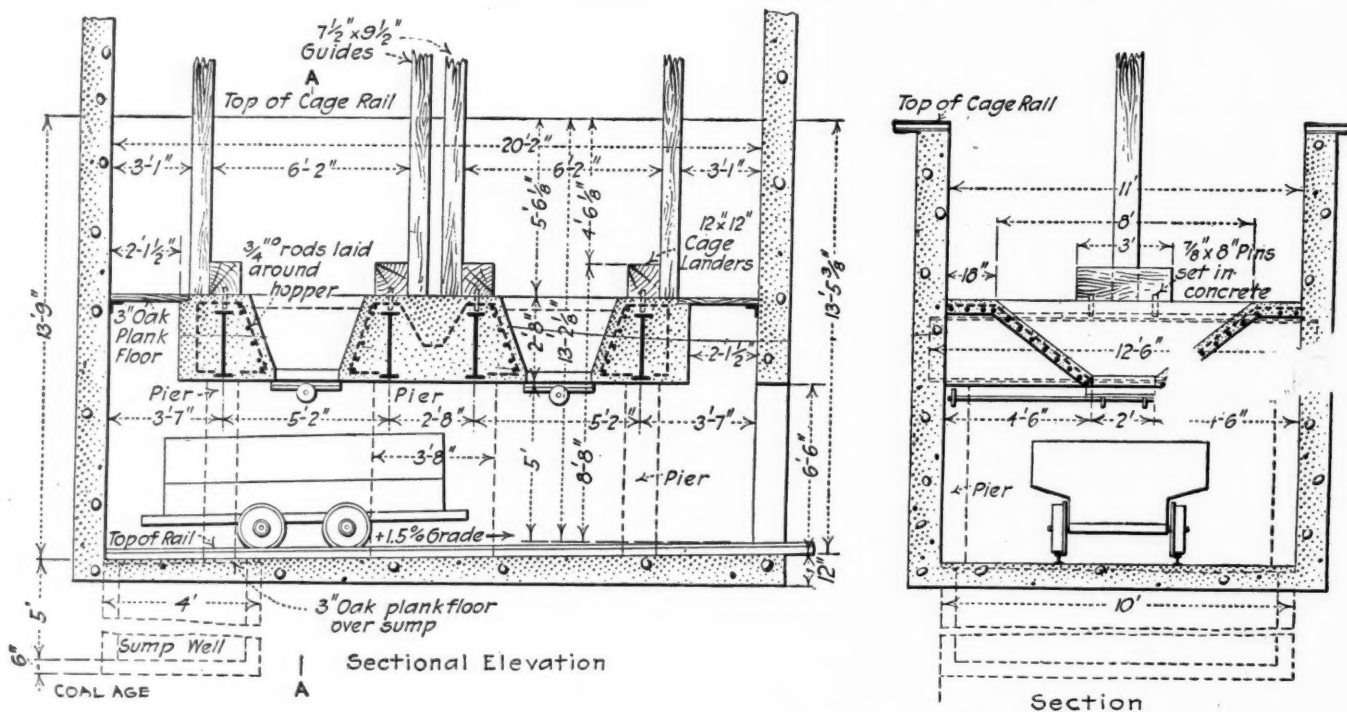


FIG. 9. LONGITUDINAL AND TRANSVERSE SECTIONS OF SUMP UNDER MAIN SHAFT

same variety. The boilers were all placed together and located at a point midway between the two shafts. The feed water was supplied by one 6-in. duplex feed pump. All water for boiler purposes was secured from the supply at the Kelly No. 2 mine and conveyed to the plant site through an 8-in. and 6-in. water line. One 10-kw. 110-volt generator was used for lighting purposes. One duplex 8x13-in. geared hoisting engine with single drum, 48 in. in diameter, was placed at the main shaft and one duplex $6\frac{1}{4}$ x10-in. double drum hoisting engine was used at the auxiliary shaft. Both hoisting engines were of friction type with link reversing motion, capable of hoisting at a speed of 400 ft. per minute under a load of 4000 lb. Nonrotating hoisting ropes $\frac{3}{4}$ in. in diameter were used at each shaft.

The muck and concrete were all handled from the same rope. One 10-hp. portable cubical concrete mixer with 5x7-in. vertical steam engine attached, having a capacity

gage track were used for the removing and distributing of the muck taken from the shafts. The concrete for the lining was conveyed from the surface to the point of application in a specially made steel dumping bucket 30 in. in diameter and 50 in. deep, with a capacity of 11 cu.ft., equipped with a steel chute and swinging door for the release of the concrete to the pouring chute. One of these buckets was used at each shaft. Fig. 12 shows the design of bucket used for this work.

TEMPORARY HEADFRAMES

The temporary headframes were of wood construction. The one used at the auxiliary shaft occupied a space for the tower of 11x18 ft., and was 41 ft. high. Each of the tower posts and batter legs was built up of two pieces of 6x12-in. yellow pine spliced and bolted together. The tower was supported on mud sills, this foundation being 48 ft. long and divided into three panels, each braced with

4x12-in. diagonals held together at the panel points with 1-in. tie rods.

The dumping floor was placed 14 ft. above the surface, and directly over the hoisting chamber a pair of self-closing doors were placed for protection to the men in the shaft when the muck bucket was dumped. These doors were built of double 2-in. plank well cleated and each leaf secured to the platform with a pair of heavy strap hinges. The doors occupied a space of 6 ft. 8 in. by 9 ft., and were automatically raised and lowered by means of a counterweight extension which was operated by the top-man.

Sinking work at each shaft was started with the aid of a wooden shoe, made of 8x12-in. timbers and having a cutting edge on a 45° angle for penetration through the

reached. The timbers were all placed skin to skin and for a distance of 60 ft. below the surface were in one stick for the sides and ends; from this point to the bottom, they were in short lengths, 10 ft. to 16 ft. long, composed of 8x10-in., 6x12-in., 4x12-in. and 2x12-in. sizes. The heavier pieces used were required in the softer strata penetrated. Eight by ten-inch temporary buntons spaced 2 ft. 6 in. apart vertically divided each shaft into three chambers.

Drilling was started when rock was reached. The first set of hitch timbers was placed in the main shaft, a distance of 55 ft., and in the auxiliary shaft 58 ft. below the surface. From these points to the shaft bottom the

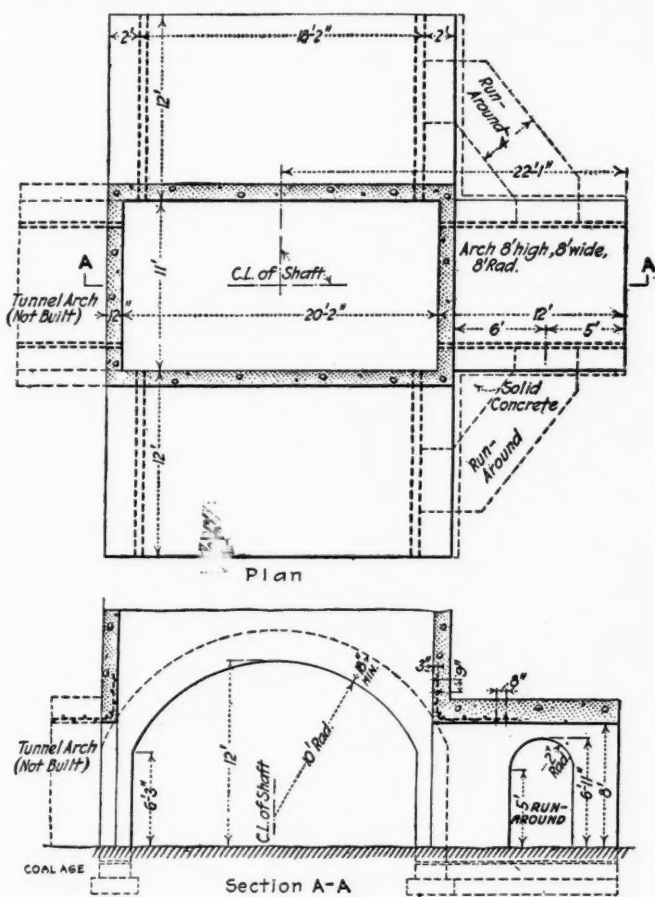


FIG. 10. PLAN AND SECTION OF MAIN SHAFT BOTTOM APPROACH ARCHES

surface soil. The latter was composed of black loam and a wet sand and clay mixture. The shoe timbers were mortised half and half at the corners and stiffened with 6x12-in. cross-pieces dividing the shaft into three chambers. The shoes were forced down by hand with 10-ton screw jacks and landed in each shaft at a depth of 12 ft. below the surface.

The top timber set or mud sill anchors at the shaft ends were 8x10 in., and extended back a distance of 25 ft. from the curbing, bolted at intervals into concrete abutments for supporting the total weight of the curbing timbers until rock was reached, a distance of 55 ft. from the surface.

At the auxiliary shaft, in addition to the timber mud sills, a heavy 24-in. I-beam with hog chains attached secured the curbing at each end until solid rock was

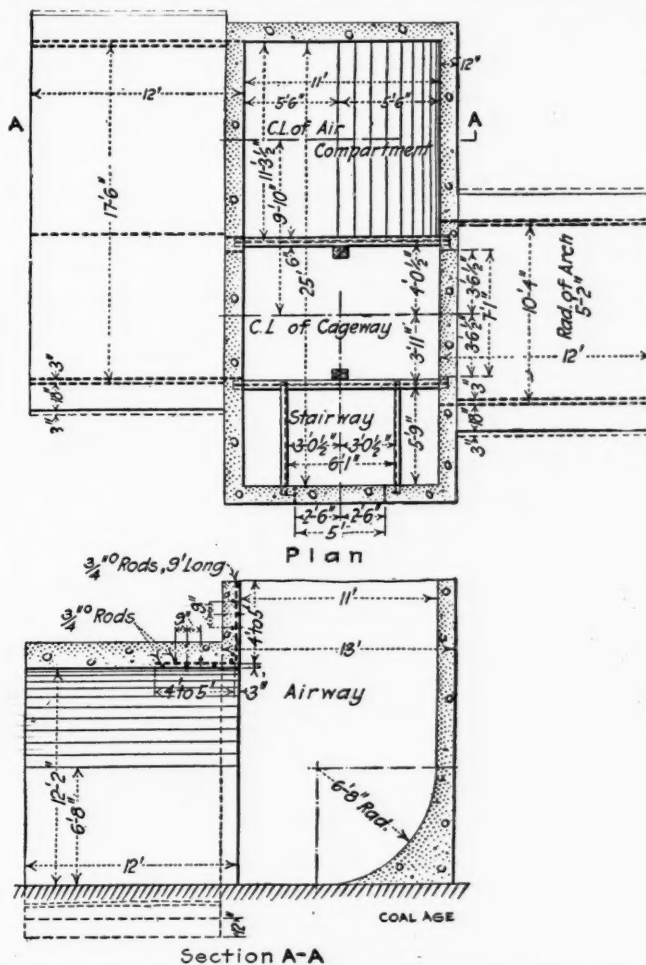


FIG. 11. PLAN AND SECTION OF AUXILIARY SHAFT BOTTOM

hitch timbers averaged 16 ft. apart. For shooting sumps and ends in each shaft an average number of 20 holes drilled 6 ft. deep were placed. Forty per cent. "Forcite" gelatin was used for the sinking of both shafts. Sinking and timbering was carried on continuously in three 8-hr. shifts and necessitated the employment of 8 men at the main shaft and 10 men at the air shaft.

The water met with in both shafts was handled by steam jets up to a depth of 60 ft. A 3-ft. 9-in. square box made of 2-in. plank answered for a suction well and was sunk in advance in the middle chamber to keep the water away from the muckers until solid rock was reached.

METHOD OF PLACING CONCRETE SHAFT LINING

The method of concreting was carried on in the same manner at each shaft. No concrete was poured until the

bottom of the sump in each shaft was reached. The sump walls, first section of the bottom arches and the shaft lining up to the top of the arch crowns were all poured together. The forms for this portion of the work were erected at one time; $1\frac{1}{2}$ x10-in. surfaced boards were used for the lining.

The arch centers were cut from $1\frac{1}{2}$ x10-in. boards spaced 17 in. center to center and covered with 1x4-in. strips for a smooth concrete face. From the top of the arches to the top of coping, special forms previously made in sections $2\frac{1}{2}$ ft. high were used; 50 vertical feet of forms were on hand and used for each shaft, necessitating four changes during the entire process of concreting.

Concrete was placed after every 5 ft. of forms were in position. It was delivered to the scaffold platform and conveyed into the sidewalls from a frame box chute 6 in. deep and 12 in. wide, the mouth of which was, however, 24 in. wide. Chutes of sufficient length reached the side and end walls.

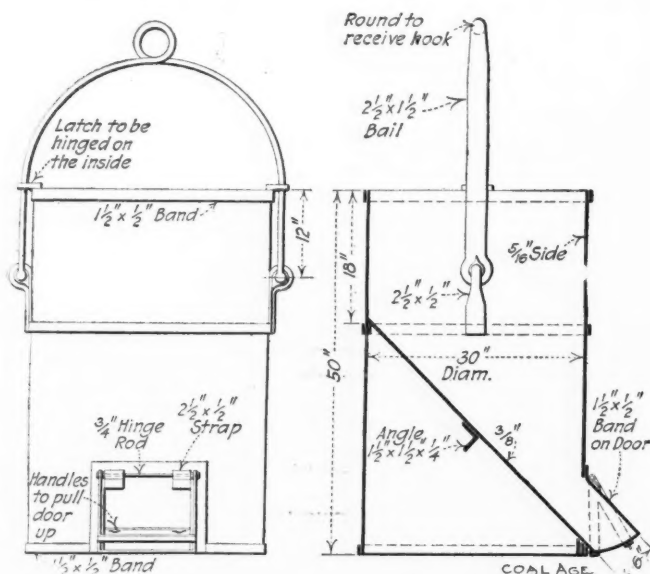


FIG. 12. SPECIAL BUCKET EMPLOYED FOR LOWERING CONCRETE INTO THE SHAFTS

At the auxiliary shaft it was necessary to use a floating double-deck scaffold for the placing and removal of the forms in the airway. This scaffold was handled by a rope on the second drum of the hoist engine. No forms were removed from the work under a period of 48 hours. The 8x10-in. buntons supporting the curbing were removed as the concrete lining advanced; these were replaced after each form was in position with 4x6-in. temporary supports for the forms until the concrete had set.

Both lines of 4x6-in. temporary buntons were supported on $1\frac{1}{2}$ x4x10-in. blocks attached to $1\frac{1}{2}$ x10-in. vertical wall plates cut in 5-ft. lengths. These plates extended back of the forms. Four $1\frac{1}{2}$ x $2\frac{1}{2}$ x10-in. blocks attached to the back of the wall plates cleared the steel angles on the forms and made a substantial support.

QUANTITIES AND MATERIALS USED IN PERMANENT WORK

In the main shaft the concrete yardage per vertical foot for 12-in. lining walls was 2.5 cu.yd. and 3.8 cu.yd. for walls having a thickness of 18 in. In the auxiliary shaft the 12-in. walls averaged 2.8 cu.yd. per vertical foot and the 18-in. walls 4.3 cu.yd. All of the concrete work was composed of one part cement and five parts of clean

Wabash River gravel. Cement for the entire work was the "Universal Brand," manufactured by the Universal Portland Cement Co. All structural steel and reinforcement was furnished by the Illinois Steel Co.

Progress of work at main shaft was as follows: Excavation started May 6, 1914. The bottom of the sump reached July 20, 1914. The total distance sunk was 225 ft. below the top of coping. The sinking operation, including the placing of the timber curbing, occupied a period of 10.7 weeks, which was an average of 21 ft. per week and 84 ft. per month. The greatest progress made in any one week was 27 ft.

Concreting started Aug. 7, 1914, and the top coping was reached Sept. 8, 1914. The concreting included the placing of 15 ft. of 8-ft. span arch for the sump tunnel and 30 ft. of 18-ft. 2-in. span arch for the bottom cage landing approaches from the empty and loaded sides. The entire work done in connection with the concreting of the shaft lining walls occupied a period of $4\frac{1}{2}$ weeks, which was an average of 50 ft. per week.

Excavation started at the auxiliary shaft on May 6, 1914, and the bottom of the sump was reached July 20, 1914. The total distance sunk was 216 ft. below the top of the coping. The sinking operation, including the placing of timber curbing, occupied a period of 10.7 weeks, which was an average of 21.2 ft. per week and 84.8 ft. per month. The greatest progress made in any one week was 31 ft.

Concreting started Aug. 7, 1914, and the top of the coping was reached Sept. 30, 1914. This process included the placing of 15 ft. of a 10-ft. 4-in. span arch at the bottom cage landing and 15 ft. of a 17-ft. 6-in. span arch leading from the bottom of the air compartment. The total work done in connection with concreting the shaft lining and the pouring of the concrete curtain wall occupied a period of 6.7 weeks, which was an average of 32.4 ft. per week and 129.6 ft. per month.

Coming Meetings

The annual meeting of the American Society of Mechanical Engineers will be held in New York City, Dec. 1, 2, 3 and 4, 1914. Calvin W. Rice, secretary, New York City.

The seventeenth annual session of the American Mining Congress will be held at Phoenix, Ariz., Dec. 7, 8, 9, 10 and 11, 1914. J. F. Callbreath, secretary, Denver, Colo.

The winter meeting of the Coal Mining Institute of America will be held Dec. 8 and 9, 1914, at the Fort Pitt Hotel, Pittsburgh, Penn. Charles L. Fay, secretary-treasurer, Wilkes-Barre, Penn.

The American Institute of Mining Engineers will hold its annual meeting in New York City, beginning Feb. 16, 1915. Papers to be presented at this meeting should be in the hands of the secretary of the Institute not later than Nov. 23, 1914, and as much before that date as possible. If a manuscript is received after Nov. 23, the editorial staff will lend its best efforts to having it prepared in time for the meeting, but cannot give assurance that it will be ready in time. Bradley Stoughton, secretary, New York City.

The Kentucky Mining Institute's winter meeting will be held Dec. 4 and 5, 1914, at the Seelback Hotel, Louisville, Ky. On Friday afternoon, at 1:30, there will be an address of welcome by the mayor of Louisville, Honorable John Buschmeyer. This will be followed by presentation of papers. At 7 p.m. there will be a banquet in the Red Room of the hotel, in conjunction with vaudeville. On Saturday at 10 a.m. papers will be presented, and in the afternoon at 1:30 a trip will be made to the Speed Cement Works. In the evening at 8 o'clock a visit to Macauley's Theater where Miss Billy Burke will appear, will terminate the meeting. H. LaViers, Paintsville, Ky., president; Ivan P. Tashof, Lexington, Ky., secretary-treasurer.

Mine Explosion at Royalton, Ill.

SPECIAL CORRESPONDENCE

SYNOPSIS—A gaseous mine, operated with open lights, exploded on Oct. 22, and as a result 51 men were killed. The authorities immediately reversed the fan, and it is believed their promptitude in pursuing this drastic measure saved many lives and jeopardized the chances of escape of few, if any. A shortage of safety lamps retarded the recovery of the mine.

✂

The most disastrous explosion that ever occurred in the coal fields of southern Illinois happened at the North mine of the Franklin Coal & Coke Co., Royalton, Ill., at 7:25 Tuesday morning, Oct. 29. Fifty-one men

7 ft., and the top coal drawn from the rooms after they have been driven up their full distance.

A GASEOUS MINE BUT WELL VENTILATED

The mining is all done by machines, and the haulage is by mule and electric motor. The mines in this field are regarded as gaseous, the Franklin and Williamson County fields having the most gas of any in the state. The ventilation system at the mine was good, and at no time was it thought necessary to put the mine on safety lamps. The fan is of the Sirocco type, 20 ft. in diameter, and 5 ft. wide, housed in a brick, steel and concrete house. It is guaranteed to deliver 200,000 cu.ft. of air per minute



SURFACE WORKS AT ROYALTON MINE SOON AFTER EXPLOSION OCCURRED

lost their lives either through the direct force of the explosion or through inhaling the afterdamp which was formed thereby.

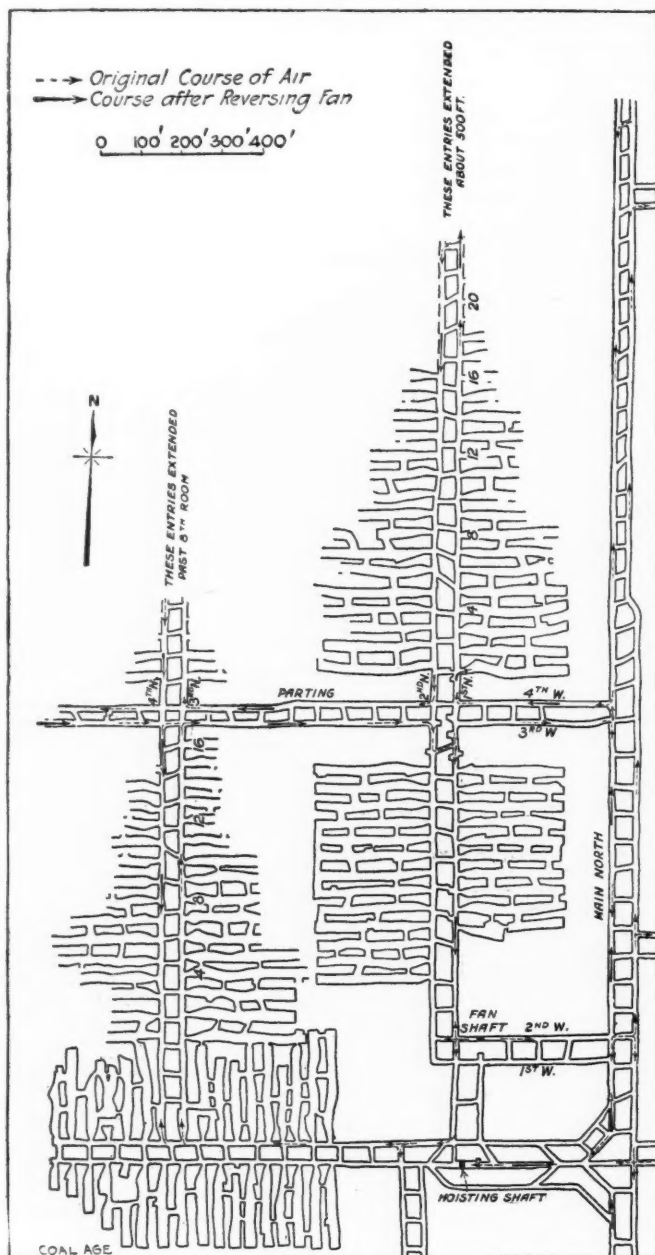
Royalton is a town entirely occupied by miners in the southern end of Franklin County, near the Williamson County line, and has a population of about 2000 people. There are two mines in the town, both operated by the Franklin Coal & Coke Co., of which J. L. Mitchell, of St. Louis, is president. The seam worked in these mines is No. 6 of the Illinois correlation, and is about 10 ft. thick. Of this, about 2½ to 3 ft. is left up as top coal, the entries and rooms being opened up to a height of about

when running at a speed not exceeding 225 r.p.m. The mine has an average output of 3000 tons per day.

The top coal left up as a roof forms an exceptionally strong covering, and no entry timbers are used in the mine. The seam is clean, and there is but little refuse in the gob.

The mine is worked on a panel system, and has four main entries, going respectively to the north, east, south and west. Nearly all the men who worked upon the first three entries mentioned and had arrived at their working places, were not only uninjured, but for some time were unaware that an explosion had occurred.

The explosion happened while the men were still being lowered into the mine, to start the day shift. At the time there were 350 men underground, and about 40 waiting their turn at the head of the shaft. Many of the men inside had not left the shaft bottom when the explosion occurred. There was but a single blast, and from all signs it was evidently caused by gas being ignited.



NORTHWESTERN SECTION OF ROYALTON COLLIERY

There had been no shooting done, so presumably the gas was set on fire by a naked light.

COURSE OF THE EXPLOSION

The explosion evidently occurred in the third or fourth north off the fourth west entry, a distance of about 3000 ft. from the hoisting shaft. At the fourth west, the force of the explosion seemed to split, part going out of the fourth west and part going down the entries to the south. About 400 ft. outbye the fourth north is a parting, on which stood a trip of loaded cars. These were piled together by the force of the explosion, and evidently blocked

it from going further in that direction. This blockage forced out the stoppings between the third and fourth west, and probably saved the part of the mine to the east.

The explosive force going down the south entries passed through the rooms on each side of these headings, went through the old workings and out to the hoisting shaft. On the east side of that shaft were two lines of loaded cars, extending for a distance of approximately 200 ft. These stopped the explosive force from going any further in that direction.

NO EVIDENCE OF VIOLENCE AT SURFACE

Neither the shaft, cages nor fan were injured by the explosion, and the only indication on the surface was the blowing of the circuit-breaker in the engine room. James Brown, the manager of the mine, was on the surface at the time, and he immediately ordered the reversal of the air current, the hoisting shaft then becoming the down-cast and the fan shaft the upcast. This reversal of the air may have caused the deaths of five or six men in the northwest entries, yet it undoubtedly saved the lives of those on the main north entry and those near the shaft bottom who were not killed by the force of the explosion. The map indicates the direction of the air current as it normally went, and also the direction after the reversal of the fan.

Men who were on the surface when the explosion occurred immediately went below in an effort to rescue their fellow workers, and succeeded in getting out several who were in the neighborhood of the shaft, and on the main north. They also recovered several dead bodies. The stoppings along the main north were substantially built of brick, and were not seriously damaged, so the rescuing forces were able to advance to the point where the third west turns off the main north.

SEVERAL RESCUE PARTIES AT THE SCENE

Calls were sent at once to the Illinois Mine Rescue Station at Benton, to the State Mining Board at Springfield, and to neighboring mines for assistance. On account of the isolated position of Royalton, most of the rescue men were obliged to secure automobiles and make the run of from 12 to 50 miles over the rough country roads. The first crew of helmet men came from the Benton Station, arriving at the mine soon after ten o'clock.

Because of the ruling recently adopted by the Illinois Mine Rescue Commission, authorizing the organization of a corps of five men at each station, these men to be in continual training and to be ready to respond to any call, there were in the Benton crew eight trained men ready for work as soon as they reached the mine.

Following them came a crew of six men from the mines of the Madison Coal Corporation, at Dewmaine, and two helmetmen from the operations of the Saline County Coal Co., at Harrisburg. During the day trained men from all over the southern end of the state appeared at the mine and volunteered for work, and about midnight a crew of helmetmen from Eldorado arrived, having covered the 50 miles in an automobile. This crew appeared just in time to relieve the men who had been working all day.

That men could be so quickly gathered together is a triumph for the management of the Illinois Mine Rescue Commission, and it is to be hoped that other mining states will follow the lead of Illinois in establishing

such mine-rescue stations at suitable central points.

Most of the afternoon was expended in exploration work and in the reestablishing of the ventilating current. By erecting a brattice about 200 ft. east of the hoisting shaft, and a stopping west of the shaft, most of the air was carried up the main north in the direction indicated by the double-pointed arrows, and thrown into the fourth west by means of a stopping on the main north. Investigation by the helmetmen proved that there was no fire anywhere, and also demonstrated that all the men inside the second north were killed immediately.

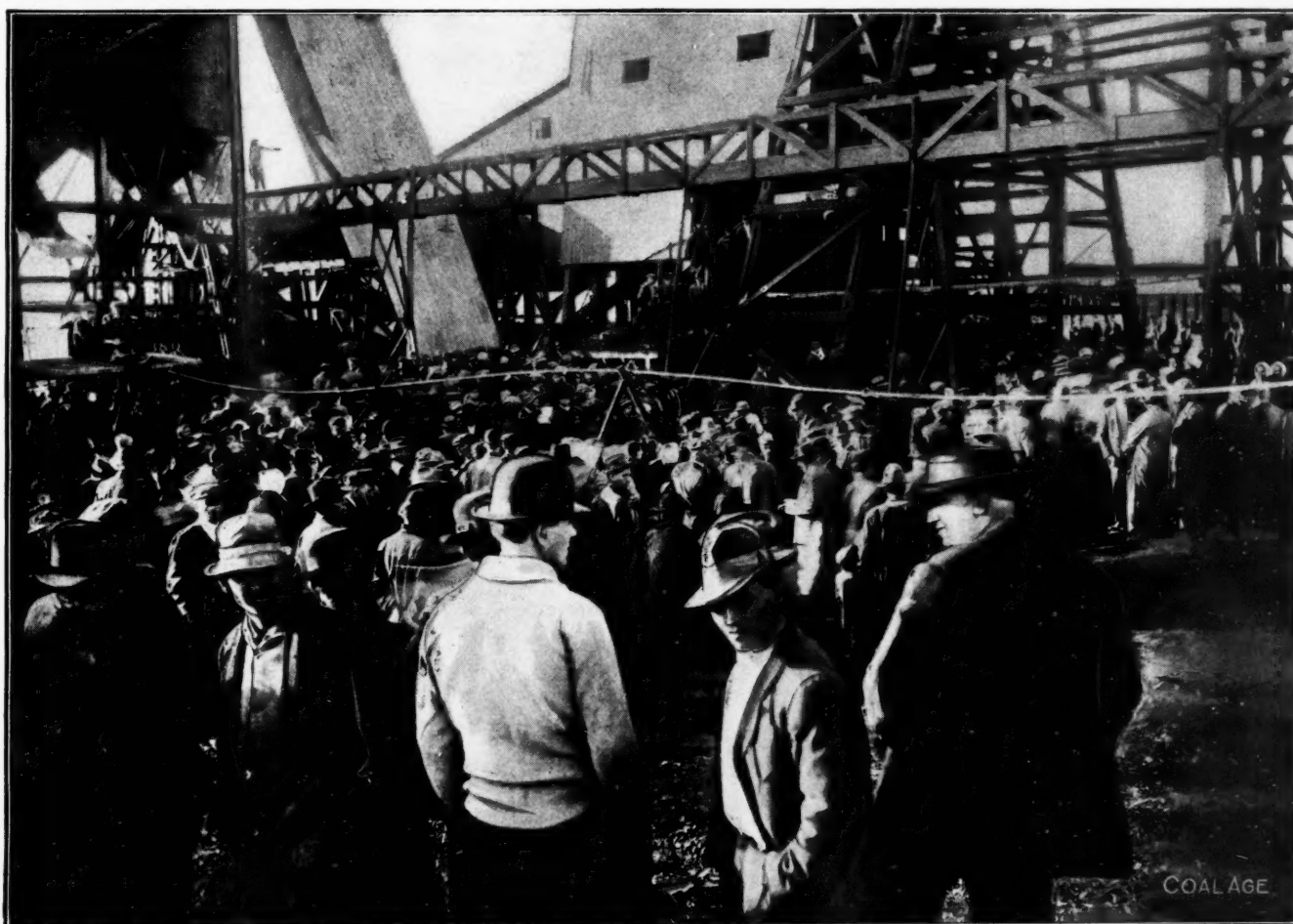
ONE MAN FOUND ALIVE

The rescue party worked its way up through the rooms on the first north, through the inside crosscut and

was uninjured. Two men found near this door were evidently overcome by the afterdamp, but all the men found from this point in showed unmistakable evidence of having been killed by the direct force of the explosion.

By eight o'clock Tuesday night, fifteen bodies had been taken from the affected area and deposited in places of safety near the bottom. They were not brought up at once, because every effort was being put forth in hunting for possible living men. The entire area affected by the explosion was not explored until nearly six o'clock Wednesday morning, but the work of bringing up the bodies was commenced before midnight, and by morning 47 bodies had been recovered.

This number included all the bodies which were in sight. The possibility of finding more was acknowledged, but the



CROWD AT SHAFT AWAITING OUTCOME OF RESCUE WORK

down the second north. On entering Room 25 on the latter entry, a man was found sitting down, with his carbide lamp burning. He was conscious, but was evidently partially overcome by the gases resulting from the explosion. The feed pipe from one of the apparatus was unscrewed and placed in his mouth, and he revived in a short time and was taken out.

This was the only man found alive, or with any signs of life, beside those rescued immediately after the explosion. That the trip of loaded cars on the parting between the second and third north stopped the force of the explosion from spreading through the mine was evidenced by the fact that the door in the slant crosscut between the first and second north, the fourth from the west entry,

only way in which more could be found was by a thorough cleaning up of the debris. During the next day, four additional bodies were discovered, bringing the total up to 51 killed.

MUCH ASSISTANCE OFFERED

During the night, frequent calls were made for volunteers to assist in building brattice and cleaning up the track, and marked eagerness to help was shown by the mining men gathered around the head of the shaft. Telephone and telegraph calls were received from many points during the day, offering assistance, and the federal mine-rescue car from Vincennes was started on the way. This went as far as DuQuoin, but was stopped there when the



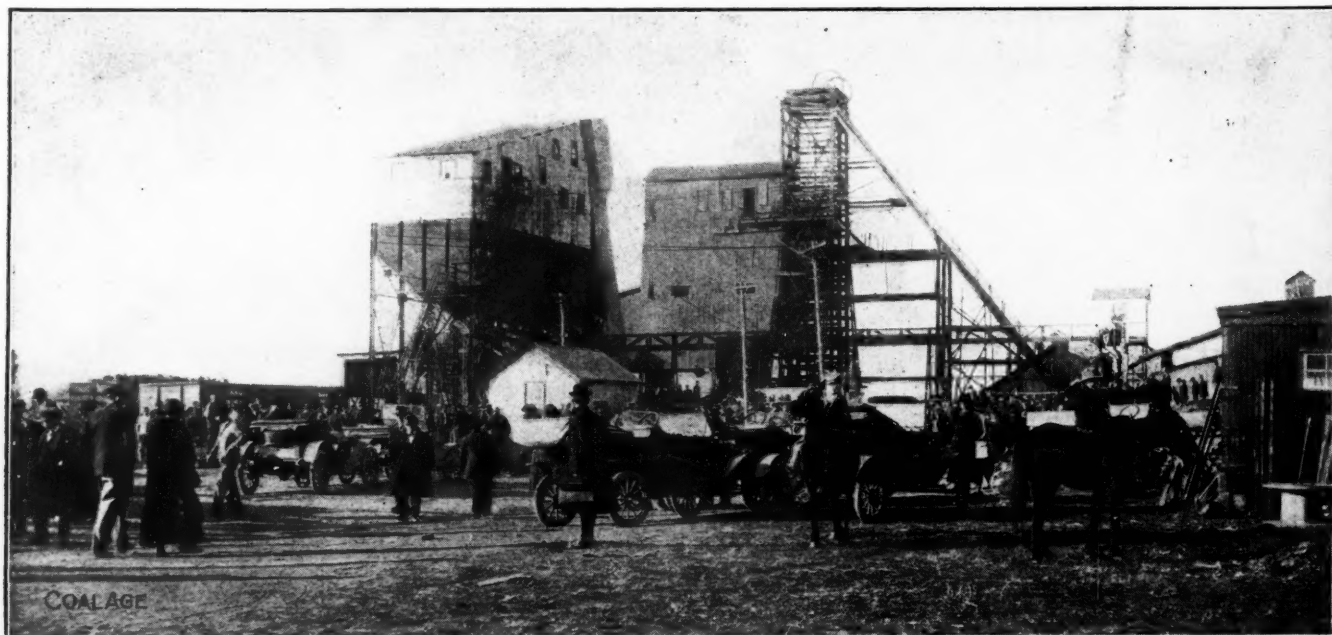
SHOWING ROYALTOWN HEADFRAME, TIPPLE AND POWER HOUSE

officials in charge were informed that there was plenty of assistance available.

A great handicap in pushing forward the recovery work was the shortage of safety lamps. Several lamps were supplied by the Chicago & Carterville Coal Co., by the

Orient mine, and by the Illinois Miners' and Mechanics' Institutes.

Following the rescue work, an extended examination of the mine was made by state and federal officials, among whom were J. W. Paul and H. I. Smith, of the U. S. Bu-



ANOTHER VIEW OF ROYALTOWN PLANT AFTER THE ACCIDENT

reau of Mines, John Bohlander, president of the Illinois Mining Board; Oscar Cartlidge, manager of the Illinois Mine-Rescue Station Commission, who was present during the entire recovery work; State Mine Inspectors Morgan, Reed and McClintock, the first two of whom were present during the work; and County Inspector Laughlin, who assisted in the recovery work. It is too early to give a report of the findings of this body.

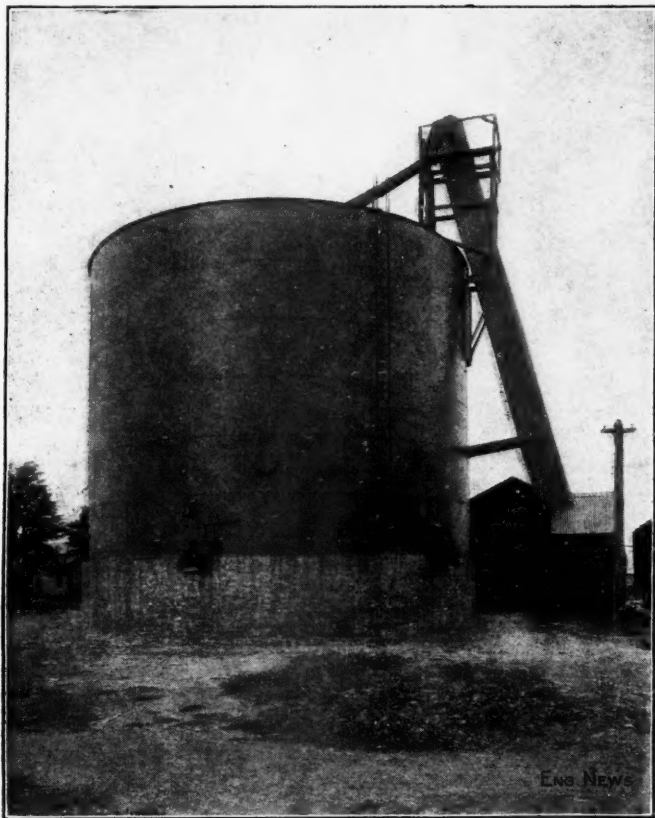
VERDICT OF CORONER'S JURY

The verdict of the coroner's jury was simply "Death by an explosion." No blame was placed on any one for the disaster. The dead were buried in a tract of land donated for the purpose by the Franklin Coal & Coke Co.

The colored rescuemen of the Madison Coal Corporation did excellent work. An illustration in our issue of Oct. 25, 1913, Vol. IV, p. 621, shows this team. Three men shown on the page preceding also did excellent work.

Steel Tank for Coal Storage

The proprietor of a retail coal yard in North East, Penn., stores his stock, except the large lump varieties of coal, in a circular steel bin, fashioned somewhat after the manner of a circular grain bin. The dimensions of



STEEL TANK FOR COAL STORAGE

the bin are, height and diameter, each about 40 ft. It rests on a brick foundation about 6 ft. high.

The coal which is to be unloaded into the bin is allowed to run from hopper-bottom cars into a pit under the center of the track. A bucket conveyor, inclosed in a chute and propelled by an electric motor, carries it to the top of the bin, where it may be diverted into any one of six compartments.

Note—From "Engineering News."

When delivery is to be made to a retail customer, the driver backs his truck under the gate of the proper compartment. The coal runs from the bin through a screen chute, so that it is cleaned while being loaded.

This method of handling coal is found to be economical and satisfactory for several reasons. The expense for labor is small and the proprietor is independent of that uncertain class of help upon which in ordinary times he must depend. Orders can be gotten out very rapidly when the first cold snap comes and a great many householders suddenly remember that they forgot to order coal. No insurance is carried on the bin shown in the view. The builder is the VonWald Engineering Co., of Buffalo, N. Y.

Recent Legal Decisions

State's Right to Tax Corporate Assets—The Tennessee Coal, Iron and R.R. Co. was organized in Tennessee, but it has general offices in Alabama, which state has by special law granted it all the powers of a domestic corporation. Held that moneys and credits payable at the Alabama offices are subject to taxation in that state. (Alabama Supreme Court, *State vs. Tennessee Coal, Iron & R.R. Co.*, 66 Southeastern Reporter 178.)

Excessive Recovery for Injury to Miner—\$3400 was excessive recovery for injury to a mining employee for injury to his leg which did not prove to be serious, where he was able to resume work at higher wages than he had obtained before the accident, and did not incur any expense on account of the accident in excess of \$400. (Keller vs. Chicago, Wilmington & Vermillion Coal Co., 184 Illinois Appellate Court Reports 248.)

Proximate Cause of Accidents—In an action for death of a mine trapper and switchman who was killed by being run over by a motor car and a train of coal cars, plaintiff was not entitled to recover on the ground that the operator had failed to comply with the safety requirements of the state mining laws, without showing that such failure was the direct cause of the accident. (Wyzard vs. Vivian Collieries Co., 184 Illinois Appellate Court Reports 199.)

Safety of Mine Doorways—Duty to Contractor's Employees—When operations in a mine are conducted by an independent contractor, and the owner of the mine undertakes to furnish means of ingress and egress for use by employees of the contractor, the owner is required to use the same degree of care to keep such means in reasonably safe condition for their safety, as is required concerning the owner's own employees. So, in such a case, the owner is liable for injury to an employee of the contractor, whose head came in contact with a low frame of a door in the mine, while he was being carried from his work in cars provided by the mine-owner, if, on account of the presence of smoke and steam in the mine, the danger was not obvious. (Pennsylvania Supreme Court, *Podona vs. Lehigh Valley Coal Co.*, 91 Atlantic Reporter, 920.)

Interesting Articles Next Week

The next issue of COAL AGE will contain a number of articles that should prove interesting to all coal-mining people. Among other things will be a description of "A Modern Method of Mine Development," illustrated with a detailed working plan. This scheme can be modified to fit most any case of a panel system of mining. The principal object of the method is maximum percentage recovery. Another article will deal with the use of "Ball Bearings on Mine Locomotives" while a third description will cover "The Pittsburgh Coal Field in Western Penn." Other special articles planned for this same issue are, "A Modern English Mine-Rescue Station," "Coal Waste in Mining Plants" and "A Testing Appliance for Coal Washeries." The information contained in any one of these articles may save you a lot of money.

Extracts from a Superintendent's Diary

This morning about nine o'clock, Joe Kosko, who tends the feeder between the run-of-mine chute and the shaking screen at No. 4 tippie suddenly jumped down from his platform and ran back and forth under the tippie yelling at the top of his voice in a most excited manner, "villain! villain! villain!"

Everybody, within hearing and seeing distance, naturally dropped the work in hand and made a bee line for Joe, and they found that he really had justification for all of the excitement he was creating.

Lying there on Joe's platform, in full view of the gathering crowd, were ten sticks of dynamite, which Joe had caught just in time to prevent being fed into the crusher.

After the initial excitement had subsided, the crowd began to offer suggestions as to the motive for the dastardly attempt at assassination, and the possible ways of discovering the offender. Had the camp been agitated by a strike or threatened strike, such a plot could have been explained easily, but we were all at peace.

But on one thing all were agreed and that was that the coward must be discovered, even if it took an army of detectives to accomplish the task, and after the villain was captured he ought to be blown up.

By this time word had traveled out through the camp and a great crowd was beginning to collect about the shaking screen and the crusher.

Joe suddenly found himself very much in the limelight and he was compelled to explain over and over again his part in frustrating the villain.

Of course, each time Joe had to add a little to keep up his own interest in the telling and finally he added as a concluding remark, "He try killy Joe, Joe he shooty that bad mans when he get a hold him."

About a half hour after Joe had astonished the tippie crew, a short insignificant looking Slav, named Mike Petrosky, came up out of the manway and made straight for the dump at the end of the tippie.

He seemed to know exactly what he expected to find, but apparently did not find it on the tippie floor and so went to the edge of the platform and looked down at Joe's platform directly underneath.

This time he had better luck. As soon as he saw the ten sticks of dynamite, he immediately started down the steps making straight for them.

Joe was just saying for the twentieth time, "Joe he shooty that bad mans."

"Those mine," interrupted Mike, pointing to the dynamite.

Quickly a crowd closed in around Mike, Joe and the dynamite.

"Kill him" shouted someone.

But Joe saved the day.

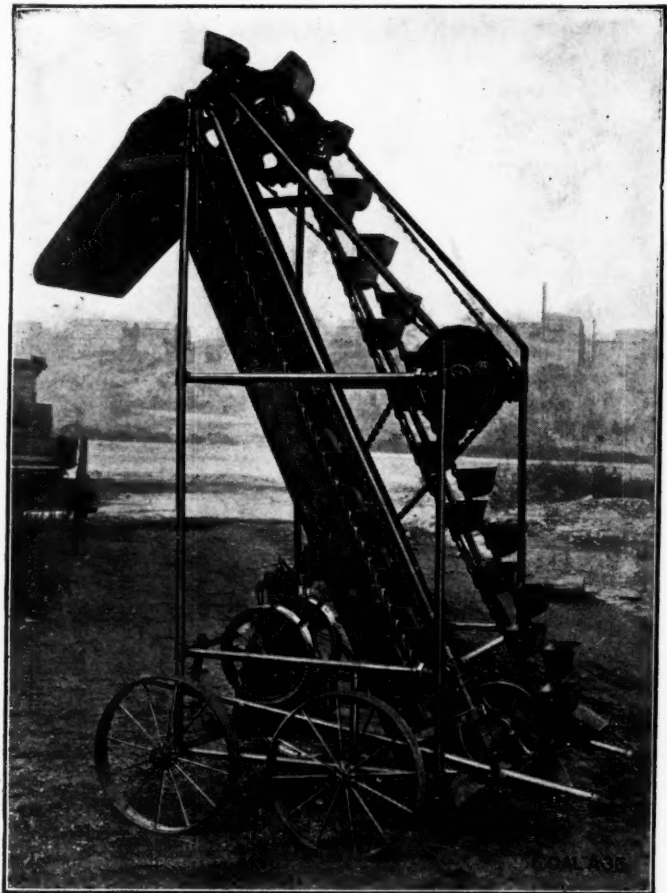
It all shot through his head like a flash. Mike had probably left the dynamite in an empty car in his room over night and in the morning had loaded coal over it without thinking. Now he had come up to claim it, entirely unconscious of the excitement he had stirred up.

And so instead of shooting Mike, Joe found himself trying to protect him until the crowd could be made to understand.

The threatened tragedy ended as comedy.

The Jersey Wagon Loader

In the Jersey loader, there have been developed a few features of great importance to a machine of this character, viz., low first cost and the maximum of convenience in handling. The manufacturers make the claim that where the machine replaces hand labor, it will effect a saving sufficient to pay for itself in 60 to 90 days. This particular apparatus is also designed so that it can be easily handled and moved from point to point in the coal yard by one man—an important consideration in such a machine.



VIEW OF THE JERSEY LOADER

The extreme height of the loader is 10 ft. over all and the weight is 1000 lb. It may be operated by either a 1-hp. gasoline engine or motor, and when working with the former motive power, the manufacturers claim that the actual cost of operation is only 4c. per hour. The machine, under normal conditions, is capable of handling one ton of coal per minute.

The chute which conveys the coal to the point of destination is provided with a removable plate, under which plate there is a screen designed to render it possible to remove all dust while the wagon is being loaded. The chute is also provided with a detachable dust retainer. All the drive parts are ball-bearing. The entire apparatus is so designed that a moderate pressure on the handles serves to bring it in balance on the two wheels, after which it is easily moved about by one man. The handles when not in use, are pushed back out of the way, as shown in the illustration.

The machine is manufactured by the Jersey Wagon Loader Co., 95 Liberty St., New York.

Editorials

The Acetylene Lamp

Only a few years ago the fact that the pouring of water on carbide compounds would generate a flame of unusual brilliancy became known. Now there are few mines not generating firedamp, where the acetylene lamp is not in use. It has the advantage over the oil lamp that it is cleaner, gives more light and is cheaper to operate.

There is a further advantage, extremely important where the danger from fire is imminent. This is that there is no wick to the lamp which, when thrown on one side ablaze, may set timbers or coal on fire. It is also possible to keep a light in a draft in which an oil lamp would go out and with the self-lighters now provided, the lamp can be far more readily ignited in a moderate wind than an oil torch. All of which excellent points have made the acetylene lamp popular.

At our request, George B. Pryde, general superintendent of the Union Pacific Coal Co., has furnished us the following facts as to the cost of burning acetylene and oil lamps. No attempt has been made to compare the candle-power-hours. Such a comparison would be far more favorable to the acetylene lamp than is even that here given. The period on which the estimates are based is a day of 8 hours.

COST OF ACETYLENE AND OIL LIGHTING

Name of Mine	Carbide Lamp	Lard-Oil Lamp
Reliance	\$0.015	\$0.048
Rock Springs.....	0.055	0.075
Cumberland	0.035	0.045
Superior	0.034	0.075
Hanna	0.034	0.070
Average	0.0346	0.0626

The estimates are based on a charge of 8 $\frac{1}{3}$ c. per lb. for carbide and 65c. to 75c. per gal. for lard oil.

We Are Each But a Part of the Community

Adam Smith, in the introduction to his great work, "Wealth of Nations," calls attention to the fact that because every man in a nation is employed in useful labor does not necessarily indicate that such a nation is prospering nor that its laborers are above being classed as "miserably poor."

To illustrate, he compares the savage tribes of hunters and fishers where every individual must provide for his family, but who are often reduced to starvation as against the ordinary workman in a thriving country where large numbers of people do not labor at all, and yet influence the produce of the whole labor of society to such an extent that the humblest workman may obtain more, as his share, than does the most prosperous member of the savage tribe.

This does not prove that the monopolist, with no love of the common herd in his makeup, who is always trying to boost food prices because he thinks he can get away with it, is a necessary evil any more than it suggests that the I. W. W. radical who is "agin" everyone with a standing on the tax list has any influence on the sum total of human happiness. It ought to suggest, however, with-

out any great stretch of the imagination that the terrible "Coal Baron" who has invested his entire fortune in the coal industry is vitally connected with any future prospects of the workers in his camp even though he does not (literally) earn his bread by the sweat of his brow.

It seems strange that in the bituminous-coal industry where the percentage of profit on capital invested is probably smaller than in any other large industry, the demands of the workers during the past few years have been the most unreasonable. If the leaders of mine labor were of the same opinion about the profits on coal mining as the average city dweller, there might be some justification for their actions, but it is hard to believe that such is the case. There are no secrets about coal-mine cost sheets, and any inhabitant of a mining village who can't figure costs within a few cents must be musty on the multiplication table.

An Adam Smith writing today would not be compelled to fall back on the almost extinct savage tribes to illustrate the futility of all men working; he could illustrate his point quite as satisfactorily with late history of the doings of the unions at Butte, where the mine owner recently was in danger of being entirely eliminated from power and consideration. Certain officials of the miners' organization threatened to kill any labor leader who suggested that the mine owners should be consulted.

Eventually those miners out there who manage to escape bombs and bullets will decide that they are only part of the community.

Colorado, a Land of Promise

The conditions in Colorado are extremely promising. To those who would work and those who won't, the prospects are alike inviting, especially to the latter or to some at least of these. We think most of our readers belong to the former class, so we will show them what opportunities Colorado offers to the worker before we expatiate on its advantage to those who do not desire to toil.

The average daily earnings of the miners of the Victor-American Fuel Co. were, between June 30, 1912, and 1913, \$4.69. The average time worked was 234 $\frac{1}{2}$ days and the average yearly earnings \$1100.75. The Colorado Fuel & Iron Co.'s average day wage for the same time was \$4.02, the time worked 248 $\frac{1}{2}$ days and the yearly income \$999.36. The Rocky Mountain Fuel Co. paid an average day wage of \$4.36, an average annual wage of \$1007.01, the men working 231 days.

As the earnings of an average American family (of which two members are employed) are less than eight hundred dollars a year and the Bureau of Census has shown that anthracite miners average about \$532 per year and bituminous miners \$516, conditions are not unfavorable for workingmen in Colorado. Some, of course, make much more money than others. Thus, four brothers of Italian origin each made \$1850 in one year digging coal in Colorado mines. The miners, as an average, received from the Colorado Fuel & Iron Co., 80.9 per cent. of their

earnings in cash, 11.73 per cent. being deducted for purchases at the company stores, 2.25 per cent. for rent and 5.12 per cent. for coal, board, powder and smithing.

But when we compare these figures with some others, we ask our readers not to be indignant, for they are far lower than have been paid by the United Mine Workers to their deserving official heads in Colorado, according to a little booklet, "Facts Concerning the Struggle in Colorado for Industrial Freedom." Frank J. Hayes was paid \$4052.92 for nine weeks' salary and \$1667.20 for expenses during the same period. Thus, he was recompensed at the rate of \$90 per day, or \$32,000 a year. John McLennan received \$2683.55 and for expenses \$1469.55, or \$66 in all per day. John R. Lawson received as his nine weeks' salary \$1773.40, or \$28 per day. Mother Jones, whose sources of income have been a matter of much inquiry, was paid \$2668.62, or \$42 per day as salary.

We do not know what were the deductions made in these accounts, how much went to buy arms and ammunition, tents and automobiles and all the grim equipment of war. But the pay is princely and clearly establishes Colorado as a land of promise and makes the earnings of the men who work for the corporations look meager beside the pickings to be obtained from serving the union.

However, the rank and file of the men in Colorado receiving pay from the United Mine Workers of America drew only \$3 per week and to them that state must have appeared like Nish or Mitrovitza.

Some Damages

Did you hear about Thomas Smith down in Arkansas who sued the Central Coal & Coke Co., for \$220,000 damages for injury done him in a mine cave-in? Well, it's a fact, and here is the itemized bill that was filed:

Twenty-five thousand dollars for physical and mental suffering; \$25,000 for medical attention and other expenditures; \$5000 for loss of earnings to date of trial; \$75,000 loss of future earning power; \$25,000 loss of pleasures as a husband; \$10,000 loss of happiness in additional children; \$25,000 for humiliating physical condition; \$10,000 for fear of impending death; \$10,000 loss by means of hunger, want and constant mortification; \$10,000 fear of deprivations after trial; \$220,000 total claims in suit.

Mr. Smith was employed as a fireboss, and alleges that a foreman of the C. C. & C. Co. sent him in to extinguish a fire that broke out in one of the entries. He attempted to do so, taking a hose with him. While playing a stream of water on the fire, the roof fell, crushing and disabling him. The plaintiff further alleges that it was not his duty to put out fires, as he was employed to inspect for gas.

Mr. Smith probably won't get anything like the absurd amount to which he lays claim, but the mere fact that such claims can be filed for judgment should prove a warning to our coal companies. The time has arrived when accidents simply must be avoided or the ghost of bankruptcy will loom large on the coal operator's horizon.

Workmen's Insurance in Germany

In view of the great interest in the United States concerning workmen's insurance, the results of similar efforts in Germany are illuminating. The Germans passed their first bill for sickness insurance in 1883, and since that time, numerous other acts dealing with the same problem

have been added, until in 1911, the basic statutes were extended to widows and orphan's insurance.

From 1885 to 1912, the following amounts were expended in Germany: Care of the sick, \$1,404,200,000; accident insurance, \$760,800,000; invalid and death insurance, \$1,123,200,000. This makes the total insurance payments, \$3,288,200,000.

It is evident from the foregoing that when applied to the entire industry of a great nation, accepted forms of workmen's insurance are no light burden on invested capital. Doubly is this true of the coal-mining business where the hazards are so exceptional.

Indemnity and liability insurance are desirable things, and we trust that some fair and equitable form of protection for our miners may be worked out. Coal mining, however, is one form of industry where great judgment must be exercised in solving the problem, for serious accidents happen in our best regulated mines, and only an unusually strong corporation could ever survive the expense it would have to shoulder if some laws now contemplated were to be passed in an unaltered form.

The Matter of Collections

In these days of world war, with the resulting uncertainty and apprehension, many coal corporations of excellent reputation are facing financial problems of great importance to their very existence. Nothing bears more heavily on all industry than a tendency to defer payment of debts. If *A* doesn't pay *B*, then the latter can't pay *C*, and so the thing extends until the wheels somewhere must stop.

It is an elementary rule of business that profit is made in proportion to the turnover; consequently collections must be made promptly if we expect efficiency and economy in our mining operations. About the only man who will resent your asking for payment of an account past due, is the fellow who proposes to do some financing at your expense.

Prompt payment of accounts is the best kind of insurance, for creditors will extend a helping hand in case of unavoidable emergency to the man who has zealously guarded his reputation when skies were blue.

A company that goes after collections diligently is always the kind of corporation that also looks after each and every operating detail. Careful management, good accounting and prompt collections are invariably found associated with a sound business.

Reinforced-Concrete Construction

In a paper before the Association of Engineers, in London, Henry Adams discussed the risk of spontaneous combustion where a large quantity of coal is stored, and referred to the use of reinforced concrete for the construction of coal bins. He said that structures of creosoted timber may last for 50 years, with increasing expenditure for repairs after the first 15 or 20 years; but in 50 years a reinforced-concrete structure may be in better condition than in the year it was built. It is probable that in the future this will be the only method of construction adopted for the purpose. It seems impossible to conceive of any better material; it has every advantage and no drawback. The strength and toughness of buildings in reinforced concrete increase with age.

Discussion By Readers

The Eskmeals Test of the Verner Counter-Current Theory

Letter No. 11—In response to a personal letter written by a prominent engineer who has been deeply interested in the discussion of the counter-current theory assisting the propagation of a dust explosion in a coal mine, as advanced by John Verner, former state mine inspector in Iowa, Dr. R. V. Wheeler, of the Experimental Station at Eskmeals, writes an interesting letter.

As the letter throws much light on the bearing of the Eskmeals experiment in this discussion, I have obtained permission to present it to the readers of COAL AGE, who have been greatly interested in the question of the air factor in a coal-dust explosion.

Doctor Wheeler writes as follows:

"If, as I assume, the article to which you refer is the one written by Mr. Dean, for COAL AGE, describing his visit to Eskmeals, I would say that Mr. Dean asked my permission to publish the results of the experiment that he persuaded me to carry out, and I readily gave my consent. I thought, however, that I made it clear that the experiment did not appeal to me as a test of Mr. Verner's theory *in toto*.

"The experiment made at Mr. Dean's request is described in the *Colliery Guardian*, of Sept. 25, as follows:

The experiment at Eskmeals was carried out in the small gallery, 3 ft. 3 in. in diameter. A mixed dust was used, containing 70 per cent. coal dust and 30 per cent. incombustible dust (fuller's earth). This was done to slow down the explosion and allow more time for observing the air actions at the mouth of the gallery. Across the mouth of the tube, a board 6 in. square was supported by four coil springs, and from the board a rod 6 ft. long projected out into the open. There was a white mark on the rod, which passed through a stationary upright painted black. The rod moved back and forth as the air movements forced the board outward or inward. Half a pound per linear foot of mixed dust was strewn along the gallery to within 20 ft. of the mouth, and 1½ lb. of black powder, stemmed with 8 in. of dry clay, was fired from the cannon placed 50 ft. from the closed end of the gallery.

A whistle was blown immediately before the shot was fired, and the first action observed was a cloud of dust blown out of the mouth of the gallery. This was caused by what might be called the concussion wave from the cannon; there was no flame in this dust cloud. Then immediately there was an air inrush, then an outrush with little dust, then another inrush, then an outrush with flames, which appeared first at the top of the mouth of the tube. The final movement was an air inrush. The second air inrush was very strong, accompanied by a loud sucking or whistling noise as the air rushed into the tube.

"As regards the observations made on that occasion, they are quite in conformity with what I have frequently observed during similar experiments both in the 3-ft. 3-in. and the 7-ft. 6-in. galleries. For such experiments, *the galleries are closed at one end and open at the other*, and ignition is effected by the firing of a cannon placed 50 ft. from the closed end, pointing toward the open end. The alternate inrush of air and outburst of smoke and dust before the flame reaches the open end are most noticeable when slowly moving inflammations are obtained, such as one gets by using a mixture of 60 per cent. coal and

40 per cent. incombustible dust. I have counted as many as seven outbursts before the appearance of flame at the open end when using such a mixture strewn throughout the 7-ft. 6-in. gallery (800 ft. long).

"The first air movement is the concussion wave from the cannon (which travels with the speed of sound in air at the temperature of the gallery). There is then a pause of maybe a second or two before a rushing noise is heard, and flame can be seen (through small holes in the side of the gallery) traveling with alternate spurts and halts along the gallery. When the flame reaches within 150 or 200 ft. of the open end of the gallery these 'spurts' and 'halts' are manifested by corresponding outbursts of smoke and inrushes of air at the open end. There is an interval sometimes of several seconds between successive spurts of the flame. At length, with one last spurt, the flame issues into the open air, there then follows a rapid inrush of air, which is sufficiently powerful to draw shingle and stones from 20 or 30 ft. in front of the gallery into the gallery.

"The reason for these phenomena is, I think, clear. As I explained to Mr. Dean, the cooling of the products of combustion behind the flame creates a partial vacuum—you must remember that the rear of the gallery is closed; *no such phenomena occur when the gallery is so arranged that air can enter freely behind the flame.*"

AN INTERESTED READER.

Philadelphia, Penn.

Letter No. 12—In the issue of COAL AGE, Oct. 17, p. 623, a certain "Mining Engineer" criticizes the previous article of Samuel Dean, COAL AGE, Aug. 22, p. 294, describing the Eskmeals experiment, which was made by special request and by the courtesy of Doctor Wheeler, at that time in charge of the Experimental Station. Mr. Dean had asked that the experiment be made to prove or disprove the Verner theory of the "counter-current" as assisting the propagation of a coal-dust explosion.

While the criticisms, for the most part, condemn without disproving the statements of Mr. Dean, there are some points worthy of reply. Under the heading "Proving the Inrush Theory," it is stated that Mr. Dean's argument "does not appear at all convincing," because the pressure curve given by Mr. Dean "is meaningless, as it does not show the atmospheric line and give the relative pressures and time intervals, . . . starting from the instant when the shot was fired." Objection is also taken to the failure to "separate the effects of the igniting shot and of the explosion proper."

I would ask, What would have been gained had Mr. Dean given this additional information and showed the "atmospheric line" on his diagram and also the "time intervals," starting from the firing of the shot. Would this information have made any clearer the unquestionable fact shown by the experiment that there were *two* inrushes of air before the flame appeared at the mouth of the gallery, and demonstrated the fact shown by the

diagram that *the second inrush of air was much greater than the first*. These were the facts Mr. Dean desired to prove or disprove.

I would ask, again, What would be gained by a more marked "separation" of the effects of the igniting shot and the subsequent dust explosion. These differ only in magnitude, the inrush of air in each case being proportional to the energies of the explosions of the *shot* and of the *dust*, respectively. This difference was clearly shown in the Eskmeals experiment. The first inrush of air was small in comparison with the second inrush due to the explosion of the dust.

In speaking of the wave set up by "any violent vibration," it would seem that the writer held the opinion that the first two inrushes of air, at Eskmeals, were caused, or could have been caused, by the vibratory effect of the *shot*. He gives the following illustration:

One may, with a paddle, give a violent impulse to water in one end of a water trough, and there will be a return wave of almost the same size, followed by waves to and fro, until friction on the sides has absorbed the energy originally imparted.

This illustration, showing as it does a steadily diminishing vibratory effect, fails to support the contention that the vibration shown by Mr. Dean's diagram resulted from the *shot*, as there was not only an *increasing pressure*, but the second inrush of air into the mine instead of being less was *much greater than the first*.

While the statement that "the use of springs to suspend and hold the board in the middle does not commend itself as being good for scientific observation" may be true, this device furnished the desired visible proof of the *inrush of air* that formed the counter-current. Mr. Dean obtained, besides this *visible* evidence, *audible* proof of the same, as the noise of the air rushing into the gallery was plainly heard by the observers stationed 100 ft. away from the opening.

In this connection, I recall the remarkable experiences of Mr. McAllister, described in COAL AGE, Vol. 2, p. 881, which incidentally furnishes excellent proof of the inrush of the air into a mine, following an explosion. Referring to an explosion that occurred in a newly opened shaft mine, Mr. McAllister states that many of the workmen had left their coats hanging on the shaft timbers, and these were first drawn into the shaft (apparently by the first inrush of air preceding the general explosion of the mine) and almost instantly blown back and left hanging in the sheaves, while timbers and rock were thrown at least 300 ft. into the air by the final blast.

It would appear that to question, as "Mining Engineer" does, the statements of men who have survived an explosion and reported that they had felt the force of an inrush of air while the explosion was still in progress, would seem to serve no good purpose. Such evidence is rarely available and to say of these men that their state of "mental agitation" would render their assertions somewhat doubtful, appears as an attempt to detract from the value of actual evidence bearing on this question.

While admitting that an inrush of air following an explosion is possible, objection is made to this inrush taking place "along the bottom, in the face of an advancing explosion of coal dust," claiming that it is "completely in violation of the fundamental laws of physics." I would ask, What laws of physics are violated? Just here, it might be well to investigate what are the laws governing the compression of one gaseous body at a low tempera-

ture, by another gaseous body at a high temperature, under such conditions as exist in the mine. Until this has been made clear, the charge of "violation of the fundamental laws of physics" cannot be sustained.

In concluding his article, "Mining Engineer" asks:

If, for the moment, we assume there is a "counter-current," where does it lead us? What does it mean? Does it bring us any nearer to the prevention of explosions? It has been hinted that it suggested the cutting off of the supply of air in the mine, and this method has been practiced by shutting down the fan at shotfiring time in some Western states, including Mr. Verner's state, Iowa, and notably in Kansas and Oklahoma, which states are reported to have more explosions from shotfiring than occur in any two other coal-mining states in the country of many times their output. One mine is said to have had three in a single year, and another operation two in one month.

Is that what the theory leads to? If it does not, it should be made clear that it only deals with the internal mechanism of an explosion, is of theoretical interest only, and has no relation to the prevention of such unfortunate occurrences as otherwise the general mining public, which has neither the time nor the means of studying the matter, is liable to be seriously misled.

This is certainly a remarkable statement, coming from a mining engineer, as it indicates a doubt in his mind as to the practical bearing or influence of such an inrush of air to develop a destructive explosion, from an otherwise local occurrence. If there is the danger that the acceptance of the theory of a counter-current, in connection with dust explosions, would lead to mischievous conclusions and practices, it is the more necessary to *disprove* the theory by a thorough investigation of the facts claimed, which has been my desire.

I have faith to believe, however, that eventually the theory of the counter-current will win out and be shown to have a practical value, in respect to the *prevention* of explosions. The theory makes possible the rational explanation of the process by which the explosive combustion of dust is effected in mine workings, and explains, in a most reasonable manner, the propagation of such an explosion throughout the mine.

The study of this theory, in my opinion, will lead to the best means of preventing such explosions. *It may even be hoped that such a study will reveal the manner in which the counter-current itself may be used to arrest the progress of a dust explosion already under way, and thus furnish the desired solution of the dust-explosion problem.*

JOHN VERNER.

Chariton, Iowa.

Letter No. 13—In reading the article by "Mining Engineer," COAL AGE, Oct. 17, p. 623, relating to the Verner theory of the counter-current in respect to mine explosions of coal dust, it does not seem to me that the article, in its entirety, does justice to the theory.

The writer of the article, referring to the description of the Eskmeals explosion test given by Mr. Dean, COAL AGE, Aug. 22, p. 294, states that he does not find, either in that article or in the five reports issued by the British Commission "any avowed support of the theory." If I rightly understand Mr. Verner's view and claims, his proposition is primarily a theory formulated to explain *the cumulative action of a coal-dust explosion*, which, I am pleased to find, throws much light on the fact of such an explosion proving more intense and extensive than an explosion of firedamp in a mine.

It will be remembered by readers of COAL AGE that some time ago, in an excellent article entitled "The Air

Factor in Mine Explosions," COAL AGE, Vol. 5, p. 604, Mr. Verner offered some practical suggestions, in regard to the experimental investigation of this theory by the Federal Bureau of Mines. As far as anyone knows, these suggestions were not accepted by the Bureau, nor has any investigation been conducted along the lines indicated in detail by Mr. Verner at that time.

However, in response to the request of Samuel Dean of Delagua, Colorado, who recently visited the Eskmeals Experimental Station, the British Station undertook a simple experiment to prove or disprove the existence of such a counter-current in a dust explosion, with a view to showing the alternate outrush and inrush of air into the experimental gallery following the explosion of the igniting shot, and the later general explosive combustion of the coal dust thereby thrown into suspension in the air. While it is not claimed by anyone that this test was complete or conclusive, it was generally understood to point to the ultimate confirmation of the theory propounded by Mr. Verner.

In his article discussing the Verner theory, "Mining Engineer" regards the suggestion "that there is an inrush of air along the bottom, in the face of an advancing explosion of coal dust, . . . incomprehensible, as it seems to be completely in violation of the fundamental laws of physics." He continues, "How can there be co-existent, a great pressure of expanding gases and in the same area of combustion, a depression or void?"

One would infer from this statement that the writer makes two assumptions: 1. That the counter-current is a continuous progressive factor. 2. That the expanding force of the resulting explosive combustion of the dust is constantly and equally distributed over the entire area of opening through which the explosive wave advances. The fact is seemingly overlooked that the internal propelling force in any explosion decreases constantly as expansion takes place, while the opposing force of resistance due to the compression of the air and gases propelled through the airway increases. Now, if it can be proved that the propelling force is constant and equally distributed over the area, it must be admitted that the weaker resisting forces will be overcome and there can then be no counter-current; but, on the other hand, if one or both of the opposing forces are not thus equally distributed over the area, *it is possible for a weaker force to advance in opposition to the stronger expansive forces of the explosion, which fact forms the basis of the counter-current theory.*

In the diagram I submitted as a graphic illustration of the Verner theory, COAL AGE, Vol. 5, p. 1059, I tried to show what "Mining Engineer" styles "the chief difficulty apparent in all of the discussions by Verner and Dean." This difficulty, he states, is that "they do not separate the effects of the igniting shot and of the explosion proper." I explained clearly, Vol. 5, p. 1059, that the effect of the exploding shot was to cause a momentary vacuum condition close to the face of the heading where the shot was fired, which was due to the air at this point being swept away by the explosive blast.

Referring to this claim, Messrs. Ashworth, Vol. 6, p. 398, McCune, p. 603, and "Mining Engineer," p. 624, refuse to accept as true the momentary existence of a vacuum condition surrounding the shot, at the face of the heading. Mr. Ashworth admits that a depression might exist "if such a shot were to be fired at a gate-end, on a

longwall face." Mr. McCune, assuming that an explosion of powder or coal dust causes an equal pressure in every direction concludes "it is hard to understand" how I would explain the existence of a partial vacuum at the face of the coal surrounding the shot." In reply, allow me to say, it is well understood that if the initial point of the explosion is surrounded by an open space the explosive force will be projected radially in every direction from that initial point. This, however, is not the case in the blast projected from the mouth of a cannon or shot fired at the head of an entry; but the lines of force are projected into the entry, as I have shown in the diagram, except as these lines are deflected by the bounding walls of the heading.

In refuting the claim of a "partial vacuum" at the face of the heading where the shot is fired, "Mining Engineer" cites two instances, which he considers prove a vacuum condition impossible. The first is the Altofts experiment No. 116, in which the flame and gases passed back in the opposite direction to that in which the cannon was pointed "due to the pressure created by the shot in the explosion." The second reference is to an explosion test, made at the U. S. experimental mine, when the cannon was placed outside of a plank stopping in which a hole had been cut to admit the mouth of the cannon. This stopping was at the entrance and the cannon pointed into the mine. When the charge was fired no explosion occurred, but the stopping was blown outward by the force of the shot reacting against it. In my opinion, these instances each show the reactionary effect claimed in the theory of the counter-current. They do not disprove the momentary existence of a vacuum condition immediately surrounding and out of range of the projected blast.

I. C. PARFITT.

Jerome, Penn.

The Foreigner in Mining

Letter No. 8—I want to add a word by way of emphasizing some of the statements made in the many interesting letters that have discussed this important question. I was particularly interested in two of these letters; namely, Letter No. 3, written by Mr. Parfitt, COAL AGE, Sept. 12, p. 440; and Letter No. 5, written by Mr. Dixon, Oct. 3, p. 561.

I could not help, like Mr. Dixon, contrasting the tone of Mr. Parfitt's letter with that of Letter No. 4, written by Mr. Hogarth, which appeared on the same page. As Mr. Hogarth states, the larger proportion of this foreign element "are illiterate and come from the lowest classes in their respective countries where they never had a chance." When they first reach this country it must be acknowledged they are very ignorant and, as a result, I am afraid they are often imposed upon and their personal liberties and rights taken from them.

However, it is my observation that these people learn very fast, and I want to say that we could not at the present time get along without them, as Mr. Dixon has already indicated. The man that labors under the belief that they are not progressive is much mistaken, as when given half a chance they invariably make good citizens.

I will admit that, before the different companies started to educate this class of mine workers and to better their living conditions, they did appear to make little improvement; but I will say, with Mr. Hogarth, they greatly

appreciate what is being done for them, as is shown by the way in which they adapt themselves to their changed conditions. This fact is very evident from the general appearance of their yards and houses, which are commonly neat and well kept.

A visit to any first-class mine today reveals the fact that its labor is very largely made up of the foreign element. This is true not only of the mining end, but many of the bosses belong to this class. In my tours of inspection, I have frequently asked mine foremen why they employed Slavs or other foreigners as drivers in the mine. The reply is invariably that "they haul more coal than the boys in this country." This is not to say that Americans *cannot* haul the same coal, but they *do not*.

The spirit of coöperation is often stronger among the foreign element than among the English-speaking miners. It is coming to be the custom now among the foreigners to ask their foremen for days off when they wish to be away. They did not use to do this, which fact also shows a decided improvement as a result of their education.

Another evidence of their advancement is the objection often heard made by them, in respect to occupying any kind of a house that it is proposed to rent them. As a rule, they desire a good house, and many of them will not consent to keep boarders. Where boarders are taken, the num-

ber accommodated is much less than formerly. It used to be that from 12 to 16 boarders were crowded into a small house of four or five rooms, but this is not common now. When asked by the superintendent to keep boarders, the reply has been made, "Why do you not keep them yourself; you have a large house." This spirit, Mr. Parfitt would style, "a dominant characteristic" and smart. I also term it "smart," but in a different sense, it being, in my opinion, the result of education.

With Mr. Dixon, I regard the foreigners as the best *machine-runners* and the best loaders, and believe that it is only a question of time when these same foreigners will fill many of the official positions in our mines. For this we can blame no one but ourselves; I want to say again that the time given to the training of these people is not lost, but well spent.

In closing I want to endorse what Mr. Dixon has said that "The foreigner coming to this country judges of its laws and customs by the treatment he receives." The attempts made during the past eight or ten years to educate and better the condition of the foreigner have resulted in making them better men and their children are often hard to distinguish from our own American boys and girls, not only in dress but in manners.

PENNSYLVANIA ENGINEER.

Uniontown, Penn.

Study Course in Coal Mining

By J. T. BEARD

The Coal Age Pocket Book

GEOMETRY

The principles of geometry form the basis of all measurements, whether of **length, surface, or volume.**

Elements—Four elements may be considered as determining **location, distance and superficial or solid** measurement; they are as follows:

1. A **point** is that which has position only, in space.
2. A **line** is that which has length only.
3. A **surface** is an element of two dimensions.
4. A **solid** is an element of three dimensions.

Postulates—A postulate is a proposition that is so evident that it is accepted as true and needing no proof; as for example,

1. If a **point** moves in space it generates a **line**. If the movement is in one direction only the line is a **straight line**. If the direction is constantly changing the line is a **curved line**. If the direction changes frequently, at intervals, the line is a **broken line**.

2. If a **line** moves in any direction except that of its length it generates a **surface**. If the movement is in one direction only a **plane surface** or a **plane** is generated. If the direction is constantly changing a **curved or warped surface** is generated.

3. If a **plane surface** of given dimensions moves in any direction except in its own plane it generates a **solid**.

Angles—Angles, in geometry, are classified as plane or solid.

A **plane angle** is formed when two straight lines, having different directions, meet at a common point. The two lines lie, therefore, in the same plane, which is the **plane of the angle**. The **angle** formed is the portion of the plane included between the two lines, or the difference in direction of the lines. The point at which the two lines meet or intersect is the **vertex** of the angle.

A **solid angle** is the space included between two or more intersecting planes. When two planes intersect in a common line, forming a "wedge," the space included between them is the **angle of the wedge**. Three intersecting planes always have one common point, which is the **vertex** of the solid angle bounded by these planes. When more than three planes intersect in a common point that point is the **vertex** of the solid angle thus formed.

Plane and solid angles may be **rectilinear** when bounded by straight lines or planes; **curvilinear** when bounded by curved lines or surfaces; and **mixed** when bounded by both of these.

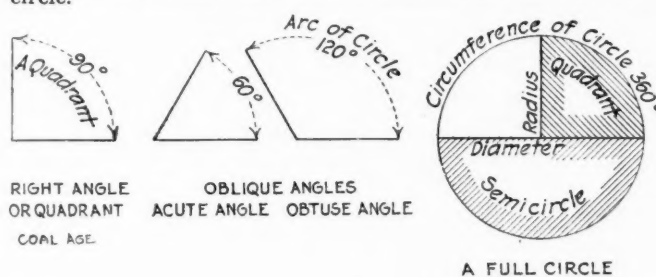
A **right angle** is one formed by the intersection of two straight lines that are perpendicular to each other. When the two intersecting lines are inclined to each other the angle formed is an **oblique angle**.

An **acute angle** is an oblique angle that is less than a right angle.

An **obtuse angle** is an oblique angle that is greater than a right angle.

The Coal Age Pocket Book

Measurement of Angles—Angles are measured by circular units called **degrees, minutes and seconds**, which will be better understood in the study of the circle. The accompanying figure shows the right angle, acute angle, obtuse angle and the circle. The circle is divided to show both the **quadrant** or quarter circle and the **semicircle**, which is a half-circle.



It is evident that there are four right angles or quadrants in a full circle; and since there are 360 deg. in the circumference of a circle, there are $360 \div 4 = 90$ deg. in the arc of a quadrant; or a right angle is 90 deg.

An acute angle is therefore always less and an obtuse angle greater than 90 deg. An angle is thus measured by the **arc** that it subtends, and this arc is expressed in degrees, minutes and seconds.

In practical work it is often convenient to subtract the angle from 90 deg. or from 180 deg. and employ this difference instead of using the given angle. This gives rise to two terms; namely,

1. The **complement** of an angle is 90 deg. minus that angle. Thus, the complement of 60 deg. is $90 - 60 = 30$ deg.; and 30 deg. and 60 deg. are therefore said to be "complementary" to each other.

2. The **supplement** of an angle is 180 deg. minus that angle. Thus, the supplement of 145 deg. is $180 - 145 = 35$ deg.; and 35 deg. and 145 deg. are therefore "supplementary" angles, in relation to each other.

Geometrical Figures—The figures employed in plane geometry are represented as bounded by straight or curved lines. The bounding line or lines taken together are called the **perimeter** of the figure and the space inclosed is its **area**. The figures of plane geometry are of two general classes.

1. The figures bounded by straight lines are mostly named from the number of their sides. They are the **triangle**, **quadrilateral**, **pentagon**, **hexagon**, **octagon**, etc., having 3, 4, 5, 6 and 8 sides, respectively.

2. The common figures bounded by curved lines are the **circle** and **ellipse**.

Inquiries of General Interest

Dulong's Formula for Calculating Heat Value of Coal

Will you kindly give what is known as Dulong's coal formula and show its application and practical use for determining the heat value of different coals. Are the results obtained in the use of the formula reliable? And is it much used in practice?

INQUIRER.

Linton, Ind.

In reply to this question, an engineer of standing writes as follows:

"In actual practice, the Dulong formula seems to be almost relegated to the past. Personally, I have never

both the proximate and the ultimate analyses of these coals are given.

It will be noticed that the several analyses show a considerable difference in the percentages of fixed carbon in the different coals, varying from a minimum of 33.76 per cent. to a maximum of 55.22 per cent. The percentages of ash in the different coals also vary considerably; from a minimum of 10.05 per cent. to a maximum of 24.81 per cent. These coals will not only vary in chemical composition, but their outward appearance will be generally quite dissimilar.

Comparing the values calculated by the use of the formula, with the experimental values determined by the Bureau of Mines, it is seen that the former agree fairly well with the latter, the calculated results being

TABLE SHOWING PROXIMATE AND ULTIMATE ANALYSES OF COALS AND THEIR EXPERIMENTAL AND CALCULATED HEAT VALUES

	Proximate Analysis					Ultimate Analysis					Dulong's Formula
	Moisture	Volatile	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen	B.T.U.	
Arkansas....	5.26	14.71	55.22	24.81	1.00	3.91	59.87	1.23	9.18	10,451	10,502
Iowa.....	14.21	33.17	37.40	15.22	4.66	5.50	54.08	1.31	19.23	10,019	10,002
Kentucky....	8.04	32.63	49.28	10.05	2.97	5.33	65.41	1.33	14.91	10,233	11,818
Missouri.....	11.50	33.63	38.01	16.86	5.16	5.12	54.79	0.96	17.11	10,179	10,054
Wyoming....	8.93	36.52	33.76	20.79	4.03	4.88	53.33	0.81	16.16	10,001	9,720

had any use for it outside of college; probably because I have not made an ultimate analysis of coal since leaving college. As is well known, most tables giving the analyses of coals give, besides, their calorific values. For this reason, mining engineers seldom have need to calculate the heating value of a coal from its ultimate analysis, preferring to take the value as given in the table. The formula, however, is of interest for the purpose of checking the heat values given in a table; or for calculating this value, in case the analysis only is given.

What is commonly known as the Dulong formula is the following:

$$h = 146 C + 620 \left(H - \frac{O}{8} \right)$$

In this formula, h equals the heat value, in B.t.u. per pound of coal; C equals percentage of carbon; H , percentage of hydrogen; and O , the percentage of oxygen, as given by the ultimate analysis of the coal. In the formula these percentages are not expressed decimally. When great accuracy is required, it is common to add to the heat value obtained by this formula, 40 B.t.u., for each per cent. of sulphur in the coal, although this is not a part of the original Dulong formula. The results as thus calculated, in the accompanying table, include this addition for the sulphur.

As a matter of curiosity, and believing that it might interest some readers of COAL AGE to compare the heat values given in the table with the values calculated from Dulong's formula, I have selected from Bulletin No. 22, U. S. Bureau of Mines, five samples of coal obtained from mines at long distances apart, each having an approximate calorific value of 10,000 B.t.u. per lb., according to the tables. The samples selected come from Arkansas, Iowa, Kentucky, Missouri and Wyoming. In the table,

sometimes a little high and sometimes a little low as compared with the values determined by experiment.

N. G. NEAR.

New York City.

Weight of Boiler

What is the weight of a boiler, 6 ft. in diameter, 16 ft. long, with sixty-six 4-in. flues? The steel is $\frac{1}{4}$ in. thick in the shell and ends and $\frac{1}{8}$ in. in the flues.

X.

Peoria, Ill.

The circumference of the boiler shell is $3.1416 \times 6 = 18.85$ ft. Multiplying this circumference by the length of the boiler and the thickness of the shell expressed in feet, which is $\frac{1}{48}$ ft., the amount of steel in the shell is $18.85 \times 16 \times \frac{1}{48} = 6.28$ cu.ft.

The area of the two ends of the boilers is $2 (0.7854 \times 6^2) = 56.55$ sq.ft. From this area must be subtracted the area cut out for the sixty-six 4-in. flues, in both ends of the boiler. This area is $2 \times 66 \times 0.7854 (\frac{1}{3})^2 = 11.52$ sq.ft. The net area of the two ends is, then, $56.55 - 11.52 =$ say 45 sq.ft. Multiplying this by the thickness of the plate, $\frac{1}{48}$ ft., gives for the amount of steel in the two ends, $45 \times \frac{1}{48} = 0.93$ cu.ft.

The superficial surface of a 4-in. flue, 16 ft. long, is $3.1416 \times \frac{1}{3} \times 16 = 16.755$ sq.ft. The amount of steel in 66 of these flues, the metal being $\frac{1}{8}$ in. or $\frac{1}{96}$ ft. in thickness, is $66 \times 16.755 \times \frac{1}{96} = 11.52$ cu.ft.

The total amount of steel in the shell, boiler ends and flues is, then, $6.28 + 0.93 + 11.52 = 18.73$ cu.ft. Then, taking the weight of wrought iron as 485 lb. per cu.ft., the total weight is $18.73 \times 485 \div 2000 = 4.54$ tons.

Examination Questions

Mine Examiners' Examination Held at Springfield, Ill., Oct. 12, 1914

(Questions Answered by Request)

Ques.—In longwall workings where there is firedamp, how would you arrange to ventilate the job; and what would you do with abandoned roadways?

Ans.—If the gas is given off in about the same quantity around the entire circle of longwall face, the air current should be split at or near the shaft bottom, into as many separate currents as is practicable; and each of these should be conducted directly to the face. At the face, each air split is again divided into two currents, one passing to the right and the other to the left along the face, till each meets a similar current returning from another section. These two return currents are then conducted through a roadway to the main-return air course.

Where this system is employed the entire longwall face should be divided into four or eight sections, according to the quantity of gas generated in the mine and the length of the face open. The main air current must be of sufficient volume to ventilate each section with a velocity sufficient to sweep away the gases that accumulate.

With four ventilating sections, there should be two main intake roads and two main return airways leading to and from the face, respectively. The intake air should be split at the head of the intake roadways and the four currents thus formed should unite and return by the two main return airways to the bottom of the upcast shaft, as just described.

When the face is divided into eight sections, there should be four main intake roads to conduct the air currents to the face where each current is divided, as before; and these, again uniting, should return by four separate airways to the bottom of the upcast shaft.

In longwall work, all abandoned roadways should be either filled solid with refuse or ventilated by a sufficient scale of air to keep them clear of gas.

Ques.—Describe the operation of clearing gas out of a working place, and state the precautions necessary to be taken while so doing.

Ans.—The exact method of proceeding can only be determined when the character of the working place is known or specified. However, where the quantity of gas is considerable, all workmen should be withdrawn from the return side before any attempt is made to dislodge the gas; and every approach to the return airways of that section should be safeguarded to prevent anyone from entering the return current unwarned. The work of removing the gas should be conducted from the intake end and the air conducted forward by a brattice, if necessary, to cause it to sweep away the gas that has accumulated. The brattice should be extended gradually as the work proceeds, ample time being allowed for the air to dilute and sweep away the gas. Only safety lamps should be used and these must be carefully watched and guarded from the effects of a possible fall of roof.

Ques.—In an airway passing 20,000 cu.ft. of air per min., the anemometer indicates a velocity of 500 ft. per min., what is the sectional area of the airway?

Ans.—Assuming that the anemometer records the average velocity of the air current, the sectional area of the airway is

$$a = \frac{q}{v} = \frac{20,000}{500} = 40 \text{ sq.ft.}$$

Ques.—(a) In a mine ventilated by several splits of air, how would you ascertain if any split was passing more than its share of the air? (b) If you found one split passing more than its share, how would you remedy the defect?

Ans.—(a) The quantity of air that will be required in each split will depend on the number of men employed and the conditions peculiar to that split. A split generating gas may require double the quantity of air in another split where no gas is generated, although the same number of men may be employed in each split. The size of the workings, condition of the stoppings, rise or dip of the roadways, etc., will also modify the quantity of air required. These conditions must determine the proper proportion of air for each split.

(b) Where more air is required in any one split than what is passing in the same, it will be necessary to regulate the air by building regulators in those splits taking more than their proper proportion. By thus obstructing the flow of air in those airways requiring a less quantity, the desired distribution of the air is obtained.

Ques.—With what object have safety lamps been provided with a bonnet or shield?

Ans.—The purpose of the *bonnet* on a safety lamp is to protect the gauze chimney from strong air currents and thus provide greater security in the upper portion of the lamp. A *shield* is often provided on a Davy lamp for the same purpose; namely, to protect the flame of the lamp from a strong air current or a sudden blast of air and prevent, if possible, the flame of the lamp being blown through the gauze.

Ques.—How would you find the area of a circular airway?

Ans.—Multiply the square of the diameter of the airway in feet, by 0.7854; the product obtained will be the sectional area of the airway, in square feet.

Ques.—A current of 3000 cu.ft. of air (and gas) is at the most explosive point; how much fresh air must be added to prevent a cap?

Ans.—Assuming that the given volume contains 9.46 per cent. of gas, the volume of gas in this current is $3000 \times 0.0946 = 283.8$ cu.ft. per min. Now, assuming that a gas cap cannot be detected ordinarily when the gas does not exceed 2 per cent., and taking this volume of gas, therefore, as 2 per cent. of the entire current after the addition of fresh air, the volume of the increased current will be $283.8 \div 0.02 = 14,190$ cu.ft. per min. The volume of air that must be added to produce this condition is then $14,190 - 3000 = 11,190$ cu.ft. per min.

Coal and Coke News

Harrisburg, Penn.

The free schools for miners are now open throughout the anthracite region, of Pennsylvania, and according to the State Department of Public Instruction the indications are that the enrollment, when compiled will show an increase over last year. More mine workers are taking advantage of the courses of instructions which won them nearly a score of mine foremen's certificates and almost a hundred assistant mine foremen's certificates from the state last year as well as many hundreds of promotions from the companies.

The full list of schools, which opened on dates ranging from the middle of October to the present includes those at Nanticoke, Glen Lyon, Wanamie, Alden, Mt. Carmel, West Coal, East Coal, Brady, Sagon, Kulpmont, Exchange, Shick-shinny, Nesquehoning, Wiconisco, Lykens, Shamokin, Ellsworth, Centralia, Lost Creek, Mahoney City, Shenandoah, Minersville and Pottsville.

No action has been taken as yet as to repeating last year's appropriation of \$140,000 for free vocational schools, part of which was devoted to the re-imbursing of two-thirds of the expenses of such of these schools as qualified for state aid, as the Legislature does not convene until January, but there have been no changes in the provisions of the act of May 1, 1913, under which the appropriation was made.

In the meanwhile the operators are guaranteeing the schools' expenses as heretofore, and helping them in many ways. The widespread interest among the mine workers in these ladders to promotion is evidenced also by the increase in the membership of the institutes new and old which are adjuncts of the schools.

PENNSYLVANIA

Anthracite

Lattimer—No coal was mined or prepared for market in the anthracite coalfield on Oct. 29, the 200,000 or more employees of the various collieries remaining idle to celebrate Mitchell Day. Only such mine employees as firemen, engineers, and pump runners remained on duty, the balance of the wage earners holding parades and mass meetings in commemoration of the victory won in 1900. The men throughout the Hazleton district did not parade but gathered at Lattimer, where they were addressed by local and visiting speakers.

Hazleton—It is said that the greatest tonnage ever produced by any individual hard-coal operator in the history of anthracite was that secured by the G. B. Markle Co., of Jeddo, for the fiscal year ending Oct. 31. Up to that date, this firm had sent somewhat over 1,500,000 tons of fuel to market.

Harrisburg—The Dauphin County Court recently granted a preliminary injunction restraining Chief of Mines, James E. Roderick and the miners' examining board in Schuylkill and Dauphin Counties from conducting examinations. This action was taken because a suit is pending to determine what constitutes practical experience as a miner.

Towanda—Development work on the property of the Loyalsock Coal Mining Co. which has been going on for about two years indicates that the firm will soon be producing coal in paying quantities. A drift has been driven into the mountain 225 ft., and the present working face shows a seam of coal 5 ft. 11 in. thick, free from slate and sulphur. A breaker has been erected equipped with modern machinery, which has a capacity of 400 tons per day.

Avoca—Three men were buried up to their shoulders in an avalanche of culm, large quantities of which were afire while the remainder was heated to burning point on Oct. 28, at the Old Forge Colliery of the Pennsylvania Coal Co. One of the men died and the other two are in a serious condition. They were engaged in removing a part of the bank so that the culm could be conveyed to a washery in a conveyor line. While they were shoveling a part of the bank which had not caught on fire they disturbed the entire side and the burning coal in tons came sliding upon them.

Bituminous

Connellsville—The Connellsville coke trade is still moving downward with no assurance that bottom is in sight. Shipments now aggregate about 214,000 tons weekly, and 2000

additional ovens were recently put out of blast by the furnace interests.

Chicora—The tipples and stables of the Morris Coal Co. near Claytonia were recently destroyed by fire. Quick work on the part of the employees saved the horses and mules from burning. The damage is estimated at \$14,000 partially covered by insurance.

Hellwood—The following officials and employees of the Berwind-White Coal Co. have resigned: H. P. Doular, superintendent; Harry Kallaway, assistant superintendent; Drs. Henry and Gourley; mine foremen and assistants, Charles Gonoe, S. Fink, Fred Fenton, Thomas Hogarth and John Shay; master mechanic, William Davis; chief and assistant electricians, Jay Flemming and Ernest Pelkington; mining engineer, Archie Donaldson and others.

Monongahela—One man was burned to death and two others overcome by flames and afterdamp in the Pattison mine of the United Coal Co., opposite Clairton on the Monongahela River recently when they became hemmed in by a fire in the mine. The men from the United States Bureau of Mines Station at Pittsburgh were summoned but the miners were imprisoned for about six hours.

WEST VIRGINIA

Herberton—The Willis Branch Coal Co., recently organized by T. K. Laing, has taken over the coal holdings of the former Herberton Collieries Co., and is preparing to open new operations, abandoning those started by the old company. The vein which will be operated is the same as that being worked by the Long Branch Coal Co.

Charleston—That the State of West Virginia can annually furnish 100,000,000 tons of coal from the 1000 mines now in operation together with the output of about 100 more that are ready to begin work when there is a demand for the product is the opinion of Earle A. Henry, chief of the State Department of Mines. Mr. Henry further believes that the production of the state will be greatly increased within the next year, and is generally optimistic concerning the coal mining industry in spite of the general falling off of orders in all states during the past month or more.

Bluefield—Several thousand feet of moving picture film portraying the Pocahontas coalfield operations in their various and interesting forms, showing the various operations through which the coal passes from the working face of the mine to the railroad car and thence to the loading piers at Newport News, will be a part of the moving picture film of West Virginia to be projected in the state building during the Panama Pacific International Exposition. A large portion of this picture film has already been taken, while the balance will be made in the near future.

ALABAMA

Coleman—In a local gas explosion of the Coleman mine, Bibb County, between 6.30 and 7 o'clock, Oct. 31, three men lost their lives, and four more were injured. The explosion occurred just as the men had entered the mine, about 125 having gone in. The mine is operated by the Blocton-Cahaba Coal Co., and little damage was done.

KENTUCKY

Mater—The Elkhorn Coal Co. is increasing its output, as are also the other small operating companies in the eastern Kentucky field. At the same time, some of the mines of the Consolidation Coal Co. and The Elk Horn Fuel Co. in the Jenkins-McRoberts-Burdine-Fleming field have closed down. The coal business, however, holds up pretty well. European war conditions are given as the cause for the dullness.

Somersett—Coal men and property owners in this part of Kentucky are much interested in the reported consummation of a deal by which Eastern capitalists, not named, are said to have taken over 100,000 acres of coal land lying in Pulaski, Rockcastle and Laurel counties and to be preparing to open up an office in Mt. Vernon. This transaction would mean another railroad for Pulaski county and it is asserted that part of the development projects of the purchasers is a railroad which will tap their holdings. It is reported that the survey is to be made at once. Hundreds of acres in the counties named are rich in coal which cannot be reached until railroads are built.

Louisville—Preparations are being made for the annual meeting here on Dec. 4 and 5 of the Kentucky Mine Institute. Prof. Ivan P. Tashop, of the Kentucky State University and secretary of the institute, is at work on the program which has been announced in a tentative form. The institute will convene on Friday afternoon, hear the address of welcome and several technical papers. At night there will be a banquet. More papers will be presented on Saturday morning. That afternoon the Speed cement mills will be visited and at night a theater party is in order. All the sessions of the institute will be at the Seelbach Hotel. A large attendance is looked for.

OHIO

Bellaire—A deal was recently closed by the Lynskey, Lynskey & Lynskey Real Estate Agency, whereby the Mat-tuci Coal Co. became the owner of the mine and equipment belonging to James Weeks. This property consists of 17 acres of coal, a tipple, and other equipment. This mine is a strictly retail proposition, no coal being shipped at present.

Columbus—According to the officers of the Lorain Coal and Dock Co., of Columbus, the company is not yet ready to make a statement concerning the rumor that one of the mines in the Belmont County field will be dismantled and the equipment moved to the Hocking Valley.

The Supreme Court of the United States has set the time for hearing arguments on the case of the Rail & River Coal Co. against the Ohio Industrial Commission involving the constitutionality of the Ohio anti-screen law for Nov. 30. Assistant Attorney General Laylin recently filed a motion in the supreme court asking for a dismissal or advancement of the case on the docket. The court accordingly advanced it. At first Chief Justice White announced a dismissal but immediately withdrew the dismissal and set it for argument.

Coshocton—John A. McGiffen, a small operator near Coshocton, Ohio, recently advertised for miners preparatory to resuming operations and a large number applied for positions. The mines throughout the Coshocton district have been idle since Apr. 1. It is said a few more of the smaller mines will resume work but the larger operators have not yet signed up.

The recently enacted anti-screen law in Ohio is the basis for an injunction suit filed by Jones Eschliman against the J. H. Somers Coal Co., of Coshocton. Eschliman leased a tract of 200 acres of coal lands to the defendant company on a percentage basis, receiving 12 cents for each ton that went over a 1¼-in. screen. Since the new law was enacted a 2-in. screen has been installed and the owner asks for an injunction restraining the company from using the latter screen.

INDIANA

Sullivan—A suit is being tried here in which a township school board is suing the Vanadalia Coal Co. for \$5000 damages for undermining the foundations of a school house. It is furthermore alleged that the coal company had not bought the mining rights under the land owned by the school board.

ILLINOIS

Hallidayboro—The Hallidayboro mine, which has been taken over by Connellsville, Penn., parties, is expected to be put in operation about the 15th of November. S. J. Harry, of Connellsville, will be general manager, and the mine superintendent will be E. M. Miller, recently with the Four States Coal Co. and the Jones interests in West Virginia.

Farmington—The Alden Coal Co. is planning to begin the use of coal mining machines in its new mine No. 8, in the near future. These machines have never been tried before in this immediate vicinity; but it is believed that even in the smaller vein existing here in comparison with the southern Illinois measures where the machines are extensively employed, a considerable saving can be made.

Chicago—David Rosenheim, a Chicago merchant, has joined with the Rev. Hiram Vrooman in bringing forward a plan of industrial coöperation. The intention is to conduct coöperative enterprises on several thousand acres of land already secured. This includes some coal mining property. The establishment of various industries, and possibly the building of a new city are contemplated.

OKLAHOMA

Muskogee—Six hundred miners of the Oklahoma Coal Co., at Henrietta, went on strike recently because the company refused to discharge a foreman whom the men had asked dismissed.

COLORADO

Denver—No date has yet been fixed for the withdrawal of Federal troops from the Colorado coal district, although it is rumored in some quarters that this withdrawal will take

place on or about Nov. 15. It is authoritatively stated that although he has received many requests that the mines of Colorado be closed, the President has no present intention of closing the mines of the state.

TRADE CATALOGS

Atlas Engineering Co., Milwaukee, Wis. Catalog. Concrete Mixers. Illustrated, 30 pp., 7x10 in.

The Goodyear Tire & Rubber Co., Akron, Ohio, Balata Belting, 24 pages, 5x8 in., illustrated.

The Goodyear Tire & Rubber Co., Akron, Ohio, Better Steam Hose, 7 pages, 3½x6 in., illustrated.

The Goodyear Tire & Rubber Co., Akron, Ohio, Flat Conveyor Belts, 15 pages, 3½x6 in., illustrated.

Link-Belt Co., Chicago, Ill. Book No. 124. Steel Chains and Sprocket Wheels. Illustrated, 40 pp., 6x9 in.

The Goodyear Tire & Rubber Co., Akron, Ohio, Goodyear Mechanical Rubber Goods, 109 pages, 6x9 in., illustrated.

The Goodyear Tire & Rubber Co., Akron, Ohio, Goodyear Kantkink Flexible Metallic Hose, 11 pages, 4x8½ in., illustrated.

Johnson & Johnson, New Brunswick, N. J. Catalog No. 110. "First Aid" Cabinets for Mines, Shops, etc. Illustrated, 16 pp., 6x8½ in.

Lehigh Car, Wheel & Axle Works, Catasauqua, Penn. Catalog No. 50. "Fuller Quality" Face Hardened Sprocket and Traction Wheels, Chilled Charcoal Iron Castings. Illustrated, 62 pp., 6x9 in.

RECENT COAL AND COKE PATENTS

Grate. J. Reagan, Phila., Penn. 1,112,383. Sept. 29, 1914. Filed July 16, 1913. Serial No. 779,365.

Furnace. J. R. Fortune, Detroit, Mich. 1,113,113. Oct. 6, 1914. Filed Dec. 5, 1911. Serial No. 664,066.

Boiler. J. E. Angell, St. Louis, Mo. 1,114,093. Oct. 20, 1914. Filed Aug. 1, 1910. Serial No. 574,934.

Grate Bar. T. H. Sly, Dunmore, Penn., 1,114,195. Oct. 20, 1914. Filed Dec. 22, 1913. Serial No. 808,193.

Mining Machine. J. A. Brantley, Atkins, Ark. 1,114,439. Oct. 20, 1914. Mar. 15, 1913. Serial No. 754,442.

Boiler Furnace. L. S. Powell, Chicago, Ill. 1,113,482. Oct. 13, 1914. Filed Sept. 20, 1913. Serial No. 790,880.

Coking Process. L. L. Summers, Chicago, Ill. 1,114,065. Oct. 20, 1914. Filed May 13, 1913. Serial No. 767,357.

Water Tube Boiler. A. Ross, London, England. 1,114,650. Oct. 20, 1914. Filed Sept. 12, 1913. Serial No. 789,470.

Coal Grate Damper. J. E. Melton, Senatobia, Miss., 1,113,032. Oct. 6, 1914. Filed Jan. 8, 1914. Serial No. 811,071.

Automatic Stoker. C. D. Young, Pittsburgh, Penn., 1,113,298. Oct. 13, 1914. Filed May 17, 1911. Serial No. 627,830.

Gas Producer Apparatus. J. A. Herrick, Newark, N. J. 1,112,534. Oct. 6, 1914. Filed Dec. 30, 1912. Serial No. 739,290.

Miner's Acetylene Lamp. Y. Ohtsuka, Tokyo, Japan. 1,113,042. Oct. 6, 1914. Filed Feb. 4, 1914. Serial No. 816,640.

Smoke Consumer. W. S. Tucker, Myrtlewood, Ala. 1,113,070. Oct. 6, 1914. Filed Dec. 3, 1913. Serial No. 804,471.

Apparatus for Treating Coals. J. D. Scott, New York, N. Y. 1,115,453. Oct. 27, 1914. Filed Aug. 26, 1910. Serial No. 579,019.

Miner's Acetylene Lamp. J. A. Wester, West Frankfort, Ill. 1,114,208. Oct. 20, 1914. Filed Mar. 24, 1913. Serial No. 756,538.

Mine Car Dumping Apparatus. C. A. Griffith, Pruden, Tenn. 1,111,830. Sept. 29, 1914. Filed May 17, 1909. Serial No. 496,560.

Under-Water Ash Ejector. J. F. Metten, Phila., Penn., 1,112,151. Sept. 29, 1914. Filed Dec. 11, 1911. Serial No. 665,018.

Trip Mechanism for Pit Cars. H. Boltendahl, Uniontown, Penn. 1,115,382. Oct. 27, 1914. Filed Aug. 21, 1914. Serial No. 857,980.

Coal Washer and Ore Concentrator. A. C. Campbell, Asheville, N. C. 1,113,876. Oct. 13, 1914. Filed May 6, 1913. Serial No. 765,277.

Fuel Saver and Smoke Consumer. J. L. Webster, Ottawa, Canada. 1,112,170. Sept. 29, 1914. Filed May 8, 1914. Serial No. 837,211.

Protector for the Heads of Boiler Flues. J. E. Landon, Phila., Penn. 1,112,373. Sept. 29, 1914. Filed May 28, 1913. Serial No. 770,385.

Coal Washing Apparatus. E. G. Burks and N. Haynes, Birmingham, Ala. 1,112,976. Oct. 6, 1914. Filed Oct. 15, 1913. Serial No. 795,302.

Mining Machine. F. L. Sessions, assignor to Jeffrey Mfg. Co., Columbus, Ohio. 1,112,332. Sept. 29, 1914. Filed Mar. 23, 1910. Serial No. 551,068.

Gas Producer. J. H. Hirt, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis. 1,114,355. Oct. 20, 1914. Filed Nov. 30, 1908. Serial No. 465,424.

Means for Crushing Coal and Similar Substances. R. W. Lyle, South River, N. J. 1,113,229. Oct. 13, 1914. Filed Dec. 27, 1911. Serial No. 668,051.

Stoker for Furnaces and Boilers of the Underfeed Type. J. McCullough, Glasgow, Scotland. 1,113,569. Oct. 13, 1914. Filed Oct. 12, 1912. Serial No. 725,510.

Locomotive Boiler Furnace. C. B. Moore, assignor to American Arch Co., New York, N. Y. 1,115,230. Oct. 27, 1914. Filed Dec. 18, 1911. Serial No. 666,338.

Gas Producer. E. W. Jeffries and G. H. Islen, assignors to Morgan Construction Co., Worcester, Mass. 1,112,702. Oct. 6, 1914. Filed Aug. 23, 1909. Serial No. 514,146.

Mechanical Stoker. H. Iserman, assignor to Multiple Grate Bar Endless Chain Stoker Co., a corporation of New York. 1,114,142. Oct. 20, 1914. Filed Sept. 11, 1911. Serial No. 648,747.

PERSONALS

J. F. Callbreath, secretary of the American Mining Congress has gone to Battle Creek, Mich., where he is going to take a few days rest.

A. D. Macfarlane, chief engineer for the receiver of the LaFollette Coal, Iron & Ry. Co. at LaFollette, Tenn., has been made also assistant manager of operation.

J. J. Wolfarsparger until recently superintendent of the Moffat Coal Co. near Oak Creek, Colo., has been appointed superintendent of the Yampa Valley Coal Co., at Oak Creek.

Carl Scholz, of Chicago, president of the American Mining Congress, is arranging to get up a party to attend the Congress during the week of Dec. 7, going to Phoenix, Ariz., in a private car over the Rock Island Lines.

C. J. Norwood, dean of the College of Mines and Metallurgy of the Kentucky State University, has just returned to Lexington from conducting a mining institute at Stone, near the West Virginia line. This was part of the extension and educational work of the college.

C. H. Nesbitt, chief mine inspector of Alabama, is in receipt of a letter from the Society of the Mining Association of the Ruhr District, Germany, dated Oct. 3, which indicates that the mines are working full time in Germany, despite the war. The letter was written from Essen, near the upper part of the German Rhine.

Fearing that the European war may create a shortage of Christmas toys, Mrs. E. B. Cox, of Drifton, Penn., whose Christmas benefactions have made her beloved by youngsters for the last 35 years, has already started a census of the 3500 children on the Cox coal lands in order that proper purchases of presents may be made for the coming Christmas.

Capt. R. S. Oakes, well known river man, who has been with the Monongahela River Consolidated Coal & Coke Co. since the organization of that firm, has severed his connections to accept a position with the West Virginia Pittsburgh Coal Co. The new position makes Capt. Oakes the master of transportation on the Ohio river for the above company. His work will be directed locally from the West Virginia Pittsburgh Coal Co.'s Mine No. 3, formerly known as the Gilchrist mine.

W. S. Thomas, general manager, of the Maderia Hill Coal Mining Co.; John Price, general superintendent, and William Rowland, inside superintendent, had a narrow escape from suffocation at Stanton Colliery, Oct. 30. A shot fired in an old working broke through a pillar. The officials believed that

water was rushing through the opening, and went there to investigate. Instead of water the workings were fast filling with white damp, brought down by the fall of rock and coal, and the three men were overcome. They fell in the gangway and would have suffocated in a short time. Workmen attracted to the scene, found the victims and carried them out of the deadly fumes at the risk of their own lives. It took the first-aid corps and two physicians more than three hours to restore the three officials to consciousness.

OBITUARY

Hiram Cobb, chief engineer of the Southern Coal, Coke & Mining Co., and in charge of its several mines, was killed on Oct. 28, while making an inspection of the Little Oak Mine, belonging to that company, near Belleville, Illinois.

Mr. Cobb was well known throughout southern Illinois as a leading mining engineer. He was 35 years old, and single, and was a resident of Voellinger Place, Belleville.

Alexander Y. Hanna, who was for many years interested in coal operation throughout Pennsylvania, having been connected with several mining companies, died recently in Philadelphia. Mr. Hanna was 51 years of age, being a native of the City of Philadelphia. While engaged actively as a coal operator, he lived in different towns throughout the state, but for the past ten years has made his home in the city of his birth.

CONSTRUCTION NEWS

Bakerton, Penn.—The Sterling Coal Co. is installing a 10-ton locomotive at the No. 6 mine located at this place.

Rockwood, Penn.—The State Line Coal Co. of this place has recently completed the construction of a new plant at South Rockwood.

Woodward, Ala.—The creosoting plant of the Woodward Iron Co. now under construction, is making good progress and will soon be ready for operation.

Portsmouth, Ohio—Work on the bridge across the Ohio River at Sciotoville has been started. The work is under the direction of the Chesapeake and Ohio Northern R.R. Co. which will build a line connecting Columbus and Portsmouth.

Charleston, W. Va.—A contract has been let by the Big Bend Coal Co. for the construction of 2½ miles of railroad near Matewan in McDowell County. Ryan & Co., of Lexington, Ky., was awarded the railroad construction contract.

Winchester, Ky.—Officials of the Louisville & Nashville R.R. have announced that the Winchester-Irvine extension of the road will probably be in operation by Jan. 1. The bridge over Red River, the most difficult piece of work remaining, is practically completed, and rails are being laid over it. This will be a heavy coal carrying line.

Pittsburgh, Penn.—The Youghiogheny Coal Co. is taking estimates for remodeling its building at 1000 Second Ave. The specifications call for removing the roof, the front wall and the east end wall of the present blacksmith shop, the tearing down of the first 80 ft. of the frame stable, and the construction of a brick shop building complete.

Salt Lake City, Utah—One of the largest pieces of railroad construction work under way in Utah this year will be completed in a few days, and will be put into immediate operation. This road, the Utah Railroad, extends from Panther Junction, 1½ miles east of Castlegate, to Mohrland, Black Hawk and Hiawatha, and was built to serve the coal mines in that district. When completed, it will represent an expenditure of more than \$3,000,000. The road will be operated by the Denver & Rio Grande Co. The length of this road in the mining district is about 21 miles, but owing to the roughness of the country unusual difficulties were encountered in the construction of the line, which accounts for the heavy cost per mile.

Williamson, W. Va.—E. L. Bailey, general manager of the Williamson Coal Co., and others expect to develop an extensive tract of valuable coal land located across the state border at Sharondale, in Pike County, Ky. A contract for the construction of a tippie and several houses has already been awarded, and work has begun. This operation will be located on the Pond Creek branch of the Norfolk & Western Ry., and will mine the Burnwell coal measure.

Two large coal operations are being developed on Blackberry Creek, the work on the tipples and houses having already been commenced, and it is expected that by the time the railroad contractors complete their work for the extension of the railway, coal will be available for market from these mines.

The Stone Mountain Coal Corporation of Matewan has made an expenditure of \$20,000 on its mine with a view to increasing the output. It is also stated that the United States Coal & Oil Co. will enlarge its tonnage by opening up and developing new mines on Pond Creek.

NEW INCORPORATIONS

Henryetta, Okla.—The Fursman Coal Co. has been incorporated here by W. H. Fursman and others. The capital stock is \$5000.

Huntington, Ark.—The Phoenix Mining Co. has been incorporated here, by L. E. Lake, E. G. Lake, A. W. Jasper and C. A. Beggs; capital, \$10,000.

Albright, W. Va.—The Realty Coal Land Co. was recently organized with an authorized capital of \$75,000. The incorporators are A. R. Malcom, James Grant, James A. Campbell, A. W. M. Cecil, and J. E. Swalm.

West Union, W. Va.—The Jackson Coal Co., owned and controlled by West Virginia men, which recently purchased an estate of 6000 acres of coal land in Illinois has increased its capitalization from \$5000 to \$750,000.

Rich Hill, Mo.—The Ideal Coal and Mining Co. has filed articles of incorporation, capitalized at \$4000, and with the purpose of developing coal fields near Home. Stockholders are Rev. John A. Davis, Dr. A. L. Billings, B. F. Billings, Elmer Whited.

Mount Sterling, Ky.—The Rush Branch Cannel Coal Co. has been organized by Lewis Apperson, J. W. Clay, M. C. Clay, John A. Judy, and R. H. Wynn, of Mount Sterling, R. G. Judy and Frank Allen, of Bath County, and W. S. Taylor, of Winchester. This firm owns a large tract of coal land in Morgan County, and will develop mines on the same at once.

INDUSTRIAL NEWS

Petersburg, Ind.—J. Mackey, owner of the Hartwell mines at Petersburg, Ind., has sold the property to the Mackey Coal Co. for \$75,000.

Washington, D. C.—The Supreme Court recently affirmed the decision of the Ohio Supreme Court holding the so-called mine run clause of the coal screen law to be constitutional.

Columbus, Ohio—The State Public Utilities Commission of Ohio has approved the application of the Hocking Valley Ry. Co. to issue \$4,000,000 six per cent. one-year notes to be sold at 97%.

Birmingham, Ala.—Members of the Chamber of Commerce of the United States were the guests of the City of Birmingham recently. The party reached Birmingham at 9 o'clock in the morning, where a special train was waiting which took them for a trip through the coal mining region of the district, as well as to the steel plants, furnaces, etc.

Portland, Ore.—The steam schooner "Rochelle" which was bringing a cargo of about 600 tons of coal from the Puget Sound country to this port last week drifted ashore because a light was out of commission at the entrance to the Columbia River and will be a total loss. This was the "Rochelle's" first voyage in the coal trade between Puget Sound and Portland.

Birmingham, Ala.—One of the most important conventions recently held in this country has just adjourned. The American Iron & Steel Institute, consisting of the foremost steel, iron and coal men in the country, has been in session in Birmingham throughout an entire week, more than 350 persons attending. They visited many of the largest mines in the district, and at one of them had an old time Southern barbecue.

Knoxville, Tenn.—The case of the Electric Corporation versus the LaFollete Coal, Iron & Ry. Co. was continued until the December term of the United States District Court, by Judge Sanford, in a preliminary hearing recently. A decree was, however, handed down ordering the preferred claims of three physicians against the defendant company and allowing the creditors until Dec. 1, in which to file claims not already filed.

Birmingham, Ala.—William A. Veditz, commercial attache of the United States at Paris, and Edwin Thompson, commercial attache of the United States at Berlin, conferred during the past week with the Birmingham Chamber of Commerce relative to exporting Alabama coal to Spain. Spain has been getting her fuel from Belgium, and must turn elsewhere, and it was for this purpose that the meeting was held. Nothing definite has yet been given out as to the results.

Columbus, Ohio—Because of complaints against the rules and regulations governing drilling for oil and gas on coal lands, the Ohio Industrial Commission has named a special committee to investigate and report changes. The special commission consists of D. A. Bartlett, Marietta; J. M. Gerard, Columbus; Lemuel G. Neeley, St. Marys; Harry E. Cameron, Cambridge; William Maloney, Bellaire; Prof. J. A. Bownocker, Ohio State University, and J. M. Roan, chief mine inspector.

Knoxville, Tenn.—Failure of the Tennessee Timber, Coal & Iron Co., of Harriman, Tenn., to meet a note for \$40,000 has led to foreclosure proceedings in the Federal Court here. Judge Sanborn appointed Frank H. Enwright, of Harriman, trustee for the company, as receiver. The petition was filed for Allen Forbes, Ashton L. Carr and Charles F. Allen, of Boston, trustees under the mortgage. The property, which includes 18,000 acres of coal and timber land in Morgan County has been advertised for sale.

Philadelphia, Penn.—On Oct. 27, two mortgages aggregating nearly \$11,000,000 were satisfied in the courts of Luzerne County, and occasioned some comment because of their size and age. They were both by the Lehigh Coal & Navigation Co., to the Fidelity Insurance, Trust and Safe Co. One was dated Apr. 1, 1864, and was for \$5,786,182.92, the other was Nov. 27, 1867, and was for \$5,000,000. Both were covered with war stamps of the Civil War period. The first carried \$5000 worth of stamps and the other \$1000 worth, the mortgages cover land in five counties.

Pittsburgh, Penn.—A strong rumor persists in Pittsburgh that J. V. Thompson, of Uniontown, has exchanged large tracts of his holdings in coal lands for Phipps property in Pittsburgh, the total value on both sides of the deal being said to amount to something like \$15,000,000. The Phipps properties reported to have been traded are the Fulton Building, the Bessemer Building, the store building at Penn Ave. and Cecil Way, the Power Building on Duquesne Way, and the warehouses on Penn Ave. between Ninth St. and Garrison Alley. It is reported that the papers in this deal have already been signed.

Columbus, Ohio—F. C. Albrecht, the chief inspector of the Ohio Department of Weights and Measures has made the announcement that he will soon start a state-wide campaign to compel retail coal dealers to give full weights. The campaign will be carried on in a number of the cities of the state, the dates to be kept secret. It is planned to cooperate with the police departments in the various cities. At Springfield last week the police called at all of the retail yards and inspected weights with the result that six arrests were made from the 19 retail yards. It is said by the state sealer that many dealers are giving but 1750 lb. for a supposed ton, but this is generally denied.

St. Louis, Mo.—Application for an increase of 10c. per ton on coal shipments over the Santa Fé and all roads operating south of St. Louis to all points in Southwest territory was recently filed with the Interstate Commerce Commission. The application is one of many that will be filed by Western railroads on various commodities. It is understood this increase on coal is to become effective Dec. 1. The proposed increases of approximately 16 per cent. in rail and lake rates on knit goods from New York and other points and trunk line territory to Chicago, St. Louis and Minneapolis were recently granted by the Commission to the New York Central Lines, and a number of other railroads, together with some other important decisions concerning railroads lying immediately south of the Great Lakes.

Cincinnati, Ohio—The third foreclosure suit which has been filed against the Cincinnati, Hamilton & Dayton R.R. Co. within the past few months was brought in the United States district court here on, Oct. 28, by the Central Trust Co. of New York and Augustus L. Mason, as trustee, against the company named, with several others, and Judson Harmon and Rufus B. Smith, receivers of the railroad company. The bill alleges default in the payment of interest to the amount of \$79,050, on bonds for \$3,162,000 issued by the Indiana, Decatur & Western Ry., which was absorbed by the Cincinnati, Indianapolis & Western Ry. and that road in turn by the Cincinnati, Hamilton & Dayton. The court is asked to appoint receivers, but the present receivers will probably be retained, as a matter of course.

Coal Trade Reviews

General Review

Anthracite production heavy last month but market is still dragging. Spot demand for bituminous has entirely disappeared and heavy concessions are the rule. Lake trade still further curtailed but Middle Western situation improved.

As a result of the continued mild weather, anthracite consumers are becoming indifferent about accumulating further stocks, and the companies are pushing hard for business. The short cold snap of last week stimulated buying for the moment, but all sizes are now in free supply, and orders generally scarce. Evidence of the poor business in the Northwest is seen in the light Lake shipments, which are fully 25% behind last season. In spite of the slowing up toward the close of last month, the production was unexpectedly large but a continuance of the mild weather will undoubtedly result in a heavy decline in shipments, operation having been somewhat curtailed through the current week.

Circular prices on the Hampton Roads coals in the coastwise trade are purely nominal, all spot business being subject to such active competition that heavy concessions are now the rule. Some coal loaded on contract is being refused and is exceedingly difficult to move. The local spot demand has practically disappeared, and there is absolutely no life to the contract market. There has also been a gradual but well defined slowing up in the export business.

Further curtailment in the steel industry is noted in the Pittsburgh district, while some of the mines shipping the Lake markets are already beginning to close down and the end of the current month will see many of these idle. One compensating feature of the light Lake trade, however, is that the tonnage has been gradually tapering off for several months so that the trade will not be subjected to the customary shock of an abrupt cessation of shipments. The short cold snap of last week caused a run of domestic orders, but it was not of sufficient duration to affect the general situation, and had also been discounted to a certain extent. The general heaviness in all lines of industry, particularly iron and steel, together with the further restriction in the Lake trade, due to the congestion at the Upper Lake ports, are the predominating features in the current market. The real test of the trade will occur in about two weeks when the Lake shipping closes down entirely.

The Southern market has touched the lowest point for several years, both as regards prices and demand, but the operators have adopted rigid curtailment policies and have the situation well in hand. The Middle Western trade through October was a big disappointment, the tonnage showing a heavy decline particularly at some points such as Chicago, where it is estimated at 60% normal. However, close observers see indications of a change for the better in the very near future. Many furnaces have now started up for the winter's run and there have been some heavy orders for war supplies placed in the Middle West, which will stimulate manufacturing.

ATLANTIC SEABOARD

BOSTON

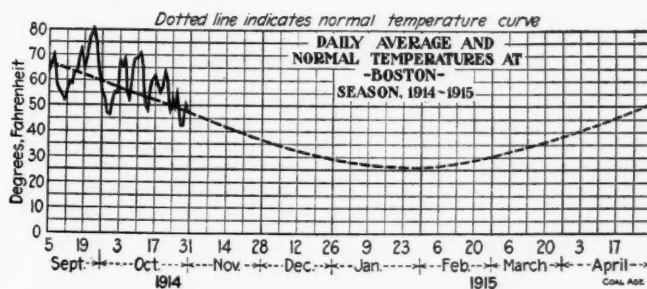
No longer any pretence of quoting \$2.85 for Pocahontas and New River. No demand, spot or contract, and outlook decidedly poor. Large purchase of Dominion coal for the local market. Distress offerings of Pennsylvania steam grades. Water freights at low level and anthracite dull.

Bituminous—Apparently none of the Hampton Roads shippers is now adhering to the \$2.85 f.o.b. price and if there were any spot market worth mentioning there would be a scramble to see who could sell at the lowest figure. As it is the low prices made lately have only shown that buyers are utterly unresponsive. The amount of spot business is practically nil and when coal now standing at the piers is absorbed it is probable, with so rigid a curtailment in force, that the volume at the Virginia ports will be the smallest at any time this year. There is no life to the demand for contract fuel either and it is generally felt that there will be no stir in the steam coal trade until settled cold weather.

Low quotations have been made generally, as low even as \$2.50 f.o.b. Hampton Roads, in the effort to place distress coal. Some low delivered prices have also been named but so far the only apparent result has been to induce two or three corporations recently in the market, to postpone purchases.

Prices at Providence and Boston for delivery to interior points are merely nominal at the season figures; there is no inquiry and shippers with unsold cargoes on their hands have a hard row to hoe.

The steam varieties from the Pennsylvania districts are developing weak spots here and there. Consignees disappointed in the failure of contractors to accept coal put on the rails for them, find it extremely hard to dispose of accumulations. There have been several such instances the past week and cuts of 15@25c. have not been sufficient to induce buying. The last shipments are being put under way now for points up the Maine rivers and soon there will not be even that small demand to help out the market. All-rail the situation is about as stagnant as at tidewater.



Water Freights are the lowest in several months. Charters on fair sized vessels can be closed easily at 60@65c., and one or two have been made at 55c., Hampton Roads to Boston. Two more steam colliers have been tied up pending improved conditions.

Georges Creek at Baltimore and Philadelphia is also in too plentiful supply but the shippers apparently realize nothing can be gained by forcing and no concessions are heard.

Anthracite—Light business continues and room for new stocks is being made only very slowly. All the companies are now in position to make prompt deliveries and from one or two sources there is complaint over the dearth of orders. Shipments to Maine ports are well in advance of the average and there are only scattering cargoes to go forward in November.

	Clearfields	Cambria Somerset	Georges Creek	Pocahontas New River
Mines*	\$0.85@1.45	\$1.20@1.55	\$1.67@1.77	
Philadelphia*	2.10@2.70	2.40@2.75	2.92@3.02	
New York*	2.40@3.10	2.75@3.10	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.50@2.75
Boston†				3.50@3.78
Providence†				3.35@3.73

* F.o.b.

† On cars.

NEW YORK

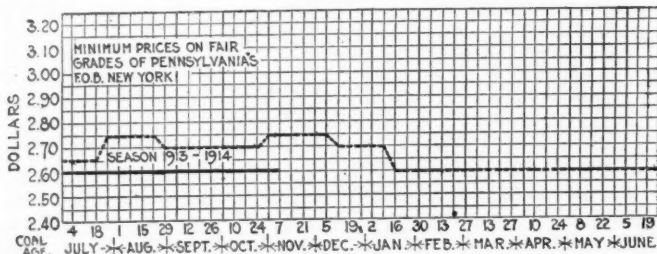
Pennsylvania R.R. declares an embargo against South Amboy. Some low prices noted on bituminous. Anthracite trade generally soft, but irregular, and with an excellent undertone.

Bituminous—The Pennsylvania R.R. last week placed an embargo on all shipments to South Amboy. It was reported that there were somewhat over 5000 loaded cars en route from the mines to this port. This reflects the present condition of the bituminous market in New York.

The call for bunker coal has not been so heavy during the past week, and the demand from industrial consumers has showed a tendency to decrease. It would seem, however, in spite of the apparent surplus running to this market, that the majority of the coal has a destination, as there is not much tendency toward moving the tonnage at really low prices. There have been one or two lots offered at South Amboy during the past week at low figures, one quotation being down to \$2 on board.

This embargo by the Pennsylvania R.R. is the first for some time, which indicates reluctance on the part of the

operator to consign coal to this market when not sold, and shows that there is a more conservative trend; costly experience has proved the futility of attempting to push tonnage on a market that will not absorb it. While there is no basis on which to warrant expectations of greatly improved conditions, the movement of an accumulation at Tidewater is usually followed by a temporary reaction, which should have a good influence. The winter season also invariably calls for increased consumption, so that it is reasonable to hope for somewhat improved conditions in the bituminous trade during the next month. The market is now quotable as follows: West Virginia steam, \$2.50@2.60; fair grades, Pennsylvania, \$2.55@2.65; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.



Anthracite—The past week finds a rather peculiar condition in the anthracite trade. One of the large companies has been forced to suspend operations for a week on account of the overstocked conditions, while another of the other representative companies worked continuously, even operating on election day.

There is no doubt that the more seasonable weather has in many respects stimulated the trade and prevented a more or less serious condition. The orders in hand up to this time have not been in great volume, but the appearance of cold weather, with the reports of snow and winter conditions in more northern territories, has increased the demand perceptibly.

The situation on stove sizes has become considerably easier, although it is still in the heaviest demand. Egg has improved considerably and chestnut is moving in good shape. Conditions in the steam sizes have improved a trifle in the past week, but they are still long. Stocks with the producing companies are quite heavy generally, but with anything like reasonable weather conditions, these should be reduced and the current workings of all the collieries taken care of.

The New York hard-coal market is now quotable on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$5.10	\$4.65@5.10	\$5.05	\$4.60@5.05
Egg.....	5.35	5.10@5.35	5.30	4.90@5.30
Stove.....	5.35	5.35	5.30	5.30
Chestnut.....	5.60	5.50@5.60	5.55	5.30@5.55
Pea.....	3.55	3.45@3.55	3.50	3.35@3.50
Buckwheat.....	2.80	2.60@2.80	2.50@2.75	2.25@2.75
Rice.....	2.30	2.10@2.30	2.00@2.25	1.60@2.25
Barley.....	1.80	1.70@1.80	1.75	1.40@1.75

BALTIMORE

Anthracite the strongest feature of a listless market. Soft coals fail to improve. Export tonnage has gradually dropped off.

Frost, ice and general wintry weather proved a boon to the hard-coal trade last week and considerable orders were reported. Many of these are from customers who are usually stocked at this time, and the promise for a fairly early fall business seems excellent. Collections are said to be easier.

Not much is to be said in favor of the soft-coal trade. Prices continue poor and demand has almost disappeared. Small orders are developing here and there, but for the most part at unsatisfactory prices and there is not much in the trade for the operator. Pennsylvania coals sell variously at from 90c@1 for less desirable grades, to \$1.15@1.40 for best qualities. West Virginia three-quarter and steam coals, and western Maryland steam fuels are selling at from 80 to 90 cents.

Export tonnage is not so large as in September. There has been a gradual but certain lessening of the movement although there is still about 2500 to 3000 tons per day being shipped.

PHILADELPHIA

Unseasonable weather conditions still discourage anthracite trade. Consumers well stocked and improvement dependent on colder weather. Bituminous market continues to lag, with no pressure for supplies.

Anthracite—The past week has seen a retrograde movement as far as the anthracite trade is concerned. The more seasonable weather of the week previous, has been followed

by almost summer temperatures, and as a result, the expected depletion of supplies did not materialize to the extent expected. Consumers seem loath to take on any additional stocks until conditions warrant it, and the dealers are playing close in the matter of buying and seem to be covered in all the sizes that are likely to be called for. Notwithstanding the depression, there is considerable coal moving. The companies are pushing hard for business, but apparently without much effect. Most of the mines were closed on Tuesday, Election Day, and some for additional periods, the average working time being four days weekly.

Prices are being fairly well maintained, except on chestnut and the small sizes. The former can be purchased at anywhere from 25 to 50c. off the present circular, and pea has moved back again, to the old basis of \$2.25, or even less. Egg and stove seem to be moving off, at circular prices in most cases with none going into stock.

In the face of the exceedingly low prices prevailing for bituminous, there seems to be a disposition on the part of many of the industrial establishments to substitute this fuel, either wholly or in part, for the more expensive anthracite steam sizes. It is understood that many requisitions have been curtailed, and it is this condition which is undoubtedly causing the surplus of the small sizes in the market.

Prices at Tidewater rule about as follows:

	Circular	Individual
Broken.....	\$4.75	\$4.75
Egg.....	5.00	5.00
Stove.....	5.00	5.10
Chestnut.....	5.25	4.90 @ 5.10

Bituminous—No new conditions have been developed in the soft-coal trade during the past week. Adverse comments are the rule rather than the exception, and there does not seem to be any indication of improvement in the near future.

HAMPTON ROADS

Fair shipments both foreign and coastwise. No change in prices. Some little demand for high volatile.

Shipments from Tidewater during the week have been fair. Export cargoes have moved to Rio de Janeiro, Genoa and Para, with one large cargo for Manila. Coastwise shipments have been made to Boston, Providence, Portland, Everett, Bangor and one or two other New England ports. As information is no longer given out at the Custom House as to destination of foreign vessels it is almost an impossibility to obtain these data. It is understood that information as to clearances will be withheld for thirty days, which should give steamers ample time to reach their destination before the general public learns where they cleared for.

Coal remaining in the railroad yards is still above normal with a fair quantity moving to the Seaboard. A large fleet of vessels is expected during the first few days of November which should reduce the accumulation down to perhaps a little below the normal supply. Prices on all grades are unchanged although it is expected that the retail circular prices on domestic coals will be advanced shortly.

It is believed that the total dumpings for the month of October will be somewhat above those for the same period last year. It is already clear that the Chesapeake & Ohio will be considerably ahead of their last year's figures, although it is not believed their dumpings will be as heavy as they were for the month of September.

COAL CHARTERS

Coal charters have been reported by the "Journal of Commerce" as follows:

Vessel	Nationality	From	To	Tons	Rate
Edgar H. Vance		Philadelphia or Baltimore	San Francisco	1523	
Chas. H. Klinek	British	Philadelphia or Baltimore or Virginia	Biddeford	444	\$0.95
Phineas W. Sprague		Newport News	Jucaro	709	
Frederic A. Duggan		Philadelphia	Cay Francis	981	
Blanche H. King		Philadelphia	Porto Rico	1021	
Emily I. White		Philadelphia	Saco	296	1.00
Edgar W. Murdock		Baltimore	Two ports Porto Rico	1215	
William Booth		Philadelphia	Calais	435	

Note—Steamers are indicated by bold face type, all others being schooners.

OCEAN FREIGHTS

A steamer was chartered last week to take about 6500 tons from Baltimore to the Philippine Islands, at \$7.50 per ton; the last charter for similar business effected in June was at \$3.41. Freight market conditions are practically the same as covered by our last report, with Trans-Atlantic freight rates advancing more rapidly than to other destinations.

We quote coal freights by steamer from New York as follows:

To	Rate	To	Rate	To	Rate
Havana.....	\$1.60@1.75	Kingston....	\$2.00@2.25†	Tampico....	\$1.85@2.00
Cardenas or					
Sagua.....	2.15@2.25	Curacao.....	1.75@1.85	Rio.....	3.96@4.20
Cienfuegos...	1.90@2.00	Santiago.....	2.20@2.35	Buenos	
				Ayres**	3.84@3.96
Port of Spain,		Guantanamo.	2.25@2.35	Valparaiso..	4.32@4.80
Trinidad.....	2.25*	Demerara....	3.00*	Mediterra-	
St. Lucia.....	2.15@2.25			nean.....	4.32@4.80
St. Thomas...	2.00*	Bermuda....	2.25*		
Barbados....	2.25*	Vera Cruz...	1.80@2.00		

* About. † Small boats to Kingston \$2.20@2.40. ** Or La Plata.
W. W. Battie & Co.'s Coal Trade Freight Report.

LAKE MARKETS

PITTSBURGH

Only about a fortnight of light shipments left to the Lake trade, but prices being already liquidated and no shock to the market is anticipated. Mining operation at about 50% of capacity, and prices irregular, \$1.15 for mine-run being usually shaded.

Scarcely a fortnight of Lake shipments is now left the coal trade, and even the present movement is at a light rate. A few mines have already closed and by the end of the month there will probably be a large number idle. There is one favorable factor in the situation; Lake shipments have been tapering off for weeks and the market will not suffer the shock it usually experiences at the close of a good season, when the demand stops suddenly instead of gradually.

The market has been weak and irregular right along, prices being dictated not by demand, but by the cost of production, and no serious decline in prices, from the present low level, can be expected. Mining operations in the Pittsburgh district this week are at an average not much above 50% of capacity. Manufacturing demand has experienced some further decrease. The steel industry, for instance, is hardly operating at more than 40% of capacity, against about 45% a week ago and somewhat above 50% at the beginning of October. Retail demand on the other hand has increased moderately, with fairly cool weather.

Prices are very irregular, mine-run being sold more often at under \$1.15 than at that figure, while slack has been firming up considerably, sales being made in the past week at 60c. or better. Nothing is heard yet as to new circular prices. Last season's prices were: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1¼-in., \$1.50, per ton at mine, Pittsburgh district.

BUFFALO

Mines working on minimum schedules but production is still excessive. No price improvement until coal on track is much reduced. Anthracite Lake shipments 25% behind last year's record.

Bituminous—It is generally reported that there is not quite as much bituminous on track as a week ago, but it is still above normal. There is too much being produced in spite of the continued complaint that the mines are running about as slow as they ever have done. There are also certain outside operators who are using this market as an overflow, offering their coal at what would be the cost of production to most mines. There is too much coal on track generally for prices to improve.

It is reported that slack is doing a little better as is to be expected at this time of the year. There is now very little slack made in connection with the Lake trade and there will soon be less. On the other hand there will soon be more of the sizes to sell and if the consumption does not improve, the surplus will be quite as large as ever. As a rule the increased consumption has been sufficient to take care of the entire late-fall surplus, but there is some doubt of this now.

Bituminous prices show no change. Quotations remain on the basis of \$2.80 for best Pittsburgh lump, \$2.70 for three-quarter, \$2.55 for mine run and \$2.15 for slack. Allegheny Valley prices rule 25c. lower for sizes. There is an increased demand for smokeless for general city use, to help comply with smoke ordinances, but prices are about the same as for other bituminous grades.

Anthracite—The end of the month found local dealers rather slow in ordering supplies, but the touch of colder weather early in the week brought in more business than formerly. The weather has been much against the coal trade and the difficulty is not over yet. There is still a shortage of stove and chestnut and a surplus of egg, which much embarrasses the shippers, who are often obliged to insist on a certain amount of egg with orders for other sizes. Independent anthracite is moving freely, most shippers finding

that they can get supplies much more readily than formerly. It sells at circular prices yet, which is evidence that there is a good general supply.

Lake shipments of anthracite continue active, the amount for the week being 122,400 tons and for the month of October, 538,250 tons as against 564,160 tons for the same month last season, a falling off of less than 26,000 tons. The shipments for the season to November are 3,695,131 tons, against 4,495,096 tons to the same date last year. Some of the companies are preparing to continue on into November without much abatement.

COLUMBUS

Colder weather has stimulated the domestic trade but not sufficient to make much of an impression. Steam business still quiet and some dullness is reported in Lake trade.

The weather conditions in Ohio improved somewhat last week and there was a better run of domestic orders, but the lower temperatures were of short duration. However, a better tone was given to the market and more optimism is apparent in coal circles generally. Steam business is still dull and there is also a falling off in Lake tonnage.

Congestion on the docks of the Upper Lake ports has become more acute and this is affecting the Lake tonnage, especially at docks where the interior movement has not gained much headway. But it is expected that conditions will improve before the close of navigation and a larger Lake movement will take place.

Domestic trade, which was temporarily stimulated by the colder weather is again quiet. Prices are generally well maintained in retail lines as few of the dealers are inclined to make concessions. Dealers' stocks are still large and buying is on a small scale. Preference is still shown for the better grades such as West Virginia splints and Pocahontas.

Steam business is the duller in months. Manufacturing is quiet because of the European war and there is little hope for immediate improvement. Contracts are being renewed at about the same figures which prevailed the previous season. Buying on the open market is one of the striking features of the steam trade.

Production continues sharply curtailed. In the Hocking Valley the output is estimated at about 60% of the average and Crooksville, Cambridge and Massillon the same. In Jackson less than 50% of the normal tonnage is produced. In the Pomeroy Bend field the output is estimated at 75% of usual.

Prices in the Ohio fields are:

	Hocking Valley	Pomeroy	Kanawha
Re-screened lump.....	\$1.60	\$1.70	.....
Inch and a quarter.....	1.50	1.50	\$1.40
Three-quarter inch.....	1.40	1.40	1.35
Nut.....	1.15	1.30	1.15
Mine-run.....	1.10	1.15	1.10
Nut, pea and slack.....	0.35	0.40	0.35
Coarse slack.....	0.25	0.30	0.25

TOLEDO

Domestic trade is slightly stiffer but steam coals are causing a great deal of anxiety. Lake movement sluggish.

Prices remain unchanged in Toledo but domestic business has picked up considerably since the cold weather began. Steam coal is causing the greatest worry as there is much difficulty in moving this grade and there is considerable on demurrage. Domestic coal is in much better shape, there being none on track in this vicinity. The Lake movement is rather sluggish but still keeping up.

No. 8 operators have practically decided that their mines will not be opened this fall even if the difficulties with the miners are adjusted, as there is no market for the coal. Local dealers generally are optimistic. Domestic is selling closer to the list and fine coal is showing some signs of increased strength.

CLEVELAND

Some new steam orders coming in and the trade is steady. Closing of Lake shipping will severely test the market.

Despite only moderately cool weather, the coal market has held all that it gained a week ago. Fine coal is selling at about the same figures that it did a week ago, but a noticeable improvement has taken place in contract business. A number of companies that have been out of the market for several weeks have placed orders for from two to five cars a day for delivery over this week. Some of these orders began to arrive the middle of last week, and it was feared that they would be only temporary, but they are proving more substantial and some other orders have been booked for delivery over the current month.

The demand is principally for nut and slack, with a few scattered orders for mine-run and the three-quarter sizes. The domestic market is somewhat firmer, the retail trade taking a little coal to replenish stocks drawn upon last week. One weak spot in the market is consignment coal of the larger sizes.

The real test of the market will come in about two weeks. The Lake shipments will then be over to all intents and the all-rail trade will have to support the business. Already the mines are reducing production, and in some instances are offering fine coal only so fast as orders are received for three-quarter. This is the case in the Goshen, Cambridge and Hocking fields. There are more properties working in Bergholz territory and Massillon. Pocahontas is stronger, but the improvement is purely in the firmness with which operators are holding to current quotations.

Anthracite is being received as fast as needed, and the demand is somewhat improved, as with other domestic coals.

Quotations for shipment are as follows:

	Pocahontas	Youghiogheny	Bergholz	Fairmount	W. Va. No. 8
Lump.....	\$3.75	.....	.....	.....	.....
Lump, 6 in.....	.....	.....	\$2.45	.....	.....
Egg, 6 in.....	3.75	.....	2.10	.....	.....
Lump, 1 1/2 in.....	.....	\$2.40	2.25	.....	.....
Lump, 1 in.....	.....	2.30	2.10	\$1.95@2.00	\$1.95@2.00
Mine run.....	2.75	2.25	1.95	1.85@1.90	1.90
Slack.....	2.40	1.65@1.70	1.65	1.65	1.65

CINCINNATI

Cold snap stimulates the domestic market, but the increase was not especially heavy. Continued weakness of the steam market hampers the trade considerably.

The first half of last week saw the coldest weather of the season, the temperature going below freezing several nights in succession. Domestic consumers, as expected, started a rush to the dealers for belated supplies, and this created a flurry which was reflected to some extent among the operators. However, this buying movement had been anticipated and already discounted to a certain extent so the effect at the mines was not such as to afford any considerable relief. The chief difficulty still lies in the extreme dullness of the steam market. Iron and steel and allied trades, continue very inactive and other industries also have little to do.

Operators are finding themselves shut off from deliveries on contract, and the spot demand being quite negligible, there is practically no place to put steam coal. The Lake demand, has practically ended, after a fairly good movement; this has made the situation worse both by diverting the coal which formerly moved in that trade, and by rendering the transportation facilities, which have been good all season, still better.

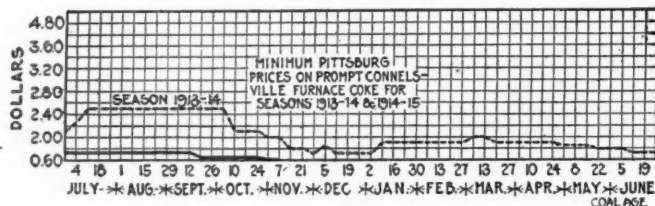
COKE

CONNELLSVILLE

Negotiations for early delivery dropped, but some inquiry appearing for next year. Prices steady. Shipments 60% of the best average rate of the year.

Negotiations that were on for November furnace coke in one or two instances have been suspended, it being found the coke will not be needed. Some inquiry has developed, however, for next year, one consumer inquiring as to a six-month contract and another as to a contract for the whole year. Except for odd lots of prompt coke sometimes sacrificed, the prompt furnace coke market is quite steady at a minimum of \$1.60, but foundry coke shows somewhat more irregularity. On the whole, transactions are extremely light, but prices are relatively well maintained, and we quote: Prompt furnace, \$1.60; contract furnace, \$1.75; prompt foundry, \$2.15@2.50; contract foundry, \$2.35@2.50, for best grades, per net ton at ovens.

The "Courier" reports production in the Connells ville and lower Connells ville region in the week ended Oct. 23 at 229,519 tons, a decrease of 8210 tons, and shipments at 214,132 tons, a decrease of 21,977 tons. The shipments were at about 60% of the best average rate reached this year, from the middle of February to the middle of April.



BUFFALO

No increase of activity and tonnage is very light.

The state of the coke trade is unchanged. The movement

continues light and prices do not improve. There is some promise of more strength to the iron trade, but it will have to occur before coke will move normally. This territory has quite a good many idle furnaces, none of which promises to start up right away. Prices rule on the basis of \$4.25 for best Connellsville foundry and \$3.30 for stock coke.

CLEVELAND

The coke trade is very light and prices are still on the low plane they have been on for several weeks. Byproduct coke is being sold at \$4.10, delivered here, although some are talking 5c. higher.

BIRMINGHAM

No business whatever is being done in furnace coke, and foundry coke is moving in small lots, with no indications of early improvement.

CHICAGO

Coke is quoted at: Byproduct, \$4.75@4.95; Connellsville, \$4.55@4.90; Wise County 72-hr. (select), \$4.55; gas coke, \$4.25; furnace coke, \$4.50@4.65.

SOUTHERN

BIRMINGHAM

Both steam and lump coal quiet, though lump shows some slight improvement.

The poor demand for steam coal continues, but there is little excess on the market, due to the fact that the operators are mining only the tonnage for which they have orders. Lump coal shows some improvement on account of the recent cold weather, and shipments for last month will be slightly larger than for September.

The majority of the mines are running only three and four days a week, and the indications are that this will be the rule during November, for even should the cold weather create a demand for lump coal, the steam grades would be hard to dispose of under present conditions. Blacksmith coal is in a satisfactory condition.

LOUISVILLE

Market has touched the lowest point for several years. Cool weather creates some stir in domestic lines but does not relieve the pressure.

Steam coals are probably lower than ever before in this part of the country. The domestic coals are active and the retail trade is exceedingly brisk, due to the belated arrival of some cool weather. The retailers are contending with the usual rush brought on by the first cold snap.

Inquiries as to coal for export have developed little if anything as yet and there has been little change in industrial conditions. Most of the mines are working, but few of them are on full time. Here and there an effective selling organization is keeping certain mines normally busy for the season, but such mines are the exception. Prices are hardly quotable. Some of the eastern Kentucky coals are selling at from \$1.40 to \$1.60 for block coal, f.o.b. mines.

MIDDLE WESTERN

CHICAGO

Short cold snap increases demand for domestic coals. Not much improvement in the call for steam fuels. Anthracite trade quiet. Market for screenings slightly improved. October tonnage only about 60% normal.

The demand for domestic sizes from the Indiana and Illinois mines has been a little better as a result of colder weather in the early part of the week. The last few days, however, have again been warm and sunny.

Screenings are somewhat stronger owing to the curtailed production of lump coal but will no doubt again be weaker when the demand for lump increases.

There seems to be a slight improvement in the steam trade. Some close observers believe this is due to better running time on the part of manufacturers of clothing, leather, motor trucks, automobiles, and other commodities for which the European warring powers have placed heavy orders in this city.

The market is now a weather proposition pure and simple. The cold weather of few days ago stimulated the demand for all sizes. It is well established that dealers in the country have not stocked anything like the usual amount of coal. The

dealers in the Central West now show a disposition to confine sales to a cash basis and their customers will not buy under this condition until they are obliged to do so by the cold weather. Householders generally have not put in supplies.

West Virginia coals are listless, and splint, smithing and the gas fuels show no improvement. Kentucky grades are being offered freely at prices ranging from 25 to 35c. below usual market quotations with few sales.

A slight increase has been noticed in the demand for anthracite during the last three days, but the effects of the continued warm weather have not yet been overcome. Some dealers in Chicago, Indiana and Illinois have received more anthracite than in former years, in anticipation of being able to dispose of it at advantageous prices later. So far weather conditions have not afforded them much encouragement.

There is an abundance of splint coal on the docks which is awaiting cold weather for a sale.

There was a better tone in the market for Franklin County coals, due to the influence of the cold wave in the early part of the week, but the effect was mostly sentimental. Indiana operators are endeavoring to market their coals at home instead of shipping them to Chicago to be sacrificed at the prices prevailing here.

October shows a considerable falling off in the tonnage as compared with previous years, being considered only about 60% normal.

Prevailing prices are as follows:

	Franklin Co.	Springfield	Carterville	Sullivan	Clinton ¹
Lump	\$1.75	\$1.75	\$1.75		\$1.75
4-in. lump				\$1.60@1.75	
Steam lump					1.20
2½-in. lump				1.50	
1½-in. lump				1.35	
Mine-run					1.10
Egg	1.75				
6x3-in. egg		1.50	1.75		
No. 1 washed egg			1.75		
No. 2 washed egg			1.75		
Nut		1.40			
No. 1 nut	1.75				
Screenings	0.50@0.75	0.50@0.75		0.40@0.75	0.35@0.60

¹ These prices are for Nos. 3 and 5 coal; No. 4 coal averages 10c. higher.

Hocking Valley 1½-in. lump, \$1.40@1.50; mine-run, \$1.25.

New River & Pocahontas lump and egg, \$2.25; mine-run, \$1.35.

Somerset Smokeless lump and egg, \$2@2.25; mine-run, \$1.25@1.40.

INDIANAPOLIS

Screenings have made a further improvement. October trade not up to average, but operators look forward to better results in November. Railroad buying slightly improved.

The feature in the Indiana coal industry is the betterment in the market for slack. For several weeks, this grade was selling largely at 30c. but it is now commanding 50c., with some companies getting 60c. Operators believe the advance must now continue until the price gets up to normal, around 80c. The change was mainly forced by the operators themselves; they reached a point where they had to either advance other grades or bring slack up to a fair value and they concentrated their efforts on the latter.

A few frosty nights have made themselves felt in the trade and there has been general lighting of furnaces for the winter run. The mines are making slightly better time. October was not up to its average and the trade is looking for the deficiency to be made up this month, which is one of the best of the year, as a rule. October was so unusually mild that householders could not be induced to stock heavily and a cold November will cause a rush at the yards.

The railroad purchases are a little better, as considerable grain has been moving. Retail prices are unchanged.

ST. LOUIS

October has been a big disappointment to the trade but there are now indications of a slight improvement.

October was such a disappointment that the trade now hardly expects to have any more good business this season. The market continued weakening throughout the month, though at the beginning there was a tendency to pick up some.

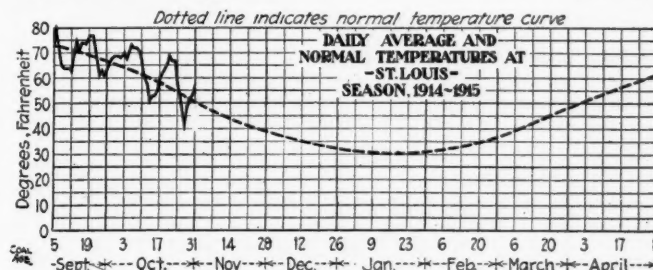
The demand is slightly better and the most noticeable thing is the fact that steam coals are in better call and the price is improving. This of course pertains only to the high grade field where conditions are somewhat peculiar.

The washed market is picking up some, and in a general way conditions have improved with the first few days in November. In the Standard district it is the same old story of selling coal for less than the cost of production. Little encouragement is held out for a betterment in the immediate future although the demand will continue to grow for domestic grades.

Anthracite is slowing up, and limited quantities of smokeless are on hand at East St. Louis under demurrage.

The prevailing circular is:

	Williamson and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump			\$1.30	\$1.05@1.15	\$1.15@1.20
3-in. lump			1.40		
4-in. lump	\$1.40@1.60		1.50	1.30@1.40	1.30@1.35
Lump and egg	1.85@2.15	\$2.25			1.35
No. 1 nut	1.30@1.45			0.75@0.80	
Screenings	0.25@0.40		0.80@0.85	0.15@0.25	0.20
Mine-run	1.05@1.10			0.75@0.80	
No. 1 washed nut	1.50@1.60	2.25	1.50		
No. 2 washed nut	1.30@1.40		1.35		
No. 3 washed nut	1.10@1.15				
No. 4 washed nut	1.00@1.05				
No. 5 washed nut	0.20@0.25				



KANSAS CITY

An attempt to advance prices is expected early in November. Business has been slow.

The coal trade has been unusually quiet this fall. The first really cold weather occurred last week, and the dealers had a taste of actual business. Dealers generally say that an effort will be made to raise prices early in the month, but there are many who believe that quotations will not actually go up until cold weather sets in.

At present coal is reported a drug on the market; wholesalers have cars on demurrage, and all retailers are overstocked. Small-town dealers in Missouri and Kansas have heavy supplies. The market for slack is heavy, selling as low as \$1.15 at the mines, and \$1.85 wholesale at Kansas City. Illinois coal has gone all to pieces, selling through the West at \$1.50 plus freight.

SAN FRANCISCO

Prices fair and the market is moderately active.

The local coal market is quite active, and dealers are taking on heavy stocks in anticipation of a good season. The summer was cool, resulting in a good trade and a maintenance of fair prices. Bituminous coals are selling to the dealers at from \$7.50 to \$8 per ton. Due to the opening of the Panama Canal, blacksmith and Pennsylvania coals coming into this market have shown a reduction of \$3 per ton in price.

Coal Contracts Pending

Contract No. 2—Norfolk, Va.—The United States Government is in the market for 200 tons of bituminous coal for use in waterway improvement work. Bids opened Oct. 12 were as follows: Pocahontas Fuel Co. (14,850 B.t.u.), \$2.63. Castner Curran & Bullitt (14,600 B.t.u.), loading at city pier: Lump, \$3.545; mine-run, \$2.545; for loading at Lamberts Point: Lump, \$3.545; mine-run, \$2.59. New River Coal Co. (14,800 B.t.u.), \$2.55. Smokeless Fuel Co. (14,800 B.t.u.), \$2.53. C. G. Blake Co. (14,850 B.t.u.), \$2.55. Nottingham & Wrenn Co. (14,800 B.t.u.), \$2.58. Chesapeake & Ohio Coal & Coke Co. (14,850 B.t.u.), \$2.59 trimmed and \$2.57 not trimmed. Johns Bros. (14,800 B.t.u.), \$2.53. All communications should be addressed to E. Eveleth Winslow, Lieutenant Colonel of Engineers, U. S. Engineer Office, Norfolk, Virginia.

Contract No. 4—Boston, Mass.—Rhode Island Co. is in the market for 90,000 to 100,000 tons of Pocahontas, New River, Georges Creek, or Somerset run-of-mine. Shipments are to be made in about monthly proportions for a year, and the point of delivery is Providence, R. I. All communications should be addressed to E. H. Raquet, Engineer of Tests, South Station, Boston, Massachusetts.

Contract No. 6—New York.—The Connecticut Co. is in the market for 22,000 tons of a good grade, low volatile, low ash, low sulphur bituminous coal for 10 months, Nov. 1, 1914 to Sept. 1, 1915. Shipments are to be as required f.o.b. boats, to be placed by the company at New York loading ports. Bids should be submitted to J. H. Sanford, Purchasing Agent, New Haven, Connecticut.

Contract No. 7—Zylonite, Mass.—The Berkshire Street Railway Co. is in the market for 21,000 tons of a good grade, low volatile, low ash, low sulphur bituminous coal for 10 months, Nov. 1, 1914 to Sept. 1, 1915. Shipments are to be as required and price to be made f.o.b. cars at mines for Tunnel Power plant at Zylonite, Mass., B. & A. R.R. Bids should be submitted to J. H. Sanford, Purchasing Agent, New Haven, Connecticut.

Contract No. 8—Portland, Ore.—Proposals for furnishing and delivering about 5000 tons of bituminous coal for use on the Dalles-Celilo Canal construction work will be received at the U. S. Engineers' Office, Portland, Ore., until 11 a.m., Nov. 27, and then publicly opened. All communications should be addressed to Major of Engineers, Jay J. Morrow, U. S. Engineers' Office, Portland, Oregon.

CONTRACTS LET

Contract No. 5—Boston, Mass.—The New York, New Haven & Hartford R.R. has closed a contract for about 350,000 tons. Half of the order was placed for Cape Breton Island coal and the remainder for West Virginia locomotive fuel.

FOREIGN

Guayaquil, Ecuador, South America—La Compania de Alumbrado (Lighting Company) is in the market for 3500 tons of gas coal. Prospective bidders should state the specific gravity, weight per cubic foot, and space occupied by one ton of gas coal. Give approximate analysis including moisture, fixed carbon, sulphur and ash, and a commercial analysis showing the gas per ton of coal, gas per cubic foot of coal, illuminating power of the gas in standard sperm candles, value of one cubic foot in grains of sperm, sperm value per ton of coal, coke per ton of coal (good quality), coke per cent. of coal, ash in coke, sulphur eliminated with the volatile products, sulphur in the coke, tar per ton of coal. Quotations should be c.i.f. Guayaquil. Address The Manager, Compania de Alumbrado, Guayaquil, Ecuador, South America.

South America—An American consular officer in that country has transmitted detailed information relative to tenders which will be received, until Nov. 1, for the supply of coal for government steamer service. American coal dealers who are interested should apply to the Bureau of Foreign and Domestic Commerce, mentioning item No. 14,016 for the reserved information.

South America—Supplementing a previous notice, the Bureau of Foreign and Domestic Commerce at Washington states that details regarding a certain inquiry from South America have been forwarded to the department, and that complete information, including blank forms on which to submit bids for supplying coal under the conditions specified can be had on application. All inquiries should mention item No. 14,048, and be addressed to the Bureau of Foreign and Domestic Commerce, at Washington, D. C.

Santiago, Chile, S. A.—Bids are wanted on 300,000 tons of coal a year during the next three years, according to press reports. The coal is to be used on the Chilean Railway. All communications should be addressed to the Department of Materials, Santiago, Chile, S. A.

Latin America—An American minister in Latin America has transmitted, by telegram, information relative to the coal market in his district. Full particulars may be had on application to the Bureau of Foreign and Domestic Commerce and its branch offices, referring to item No. 14,133.

COAL FREIGHT DECISIONS

Investigation and Suspension Docket No. 344—Coal rates from Oak Hills, Colo.

Proposed joint rates of the Denver & Salt Lake R.R. Co. and Chicago, Rock Island & Pacific Ry. Co., for the transportation of bituminous coal from Oak Hills, Colo., to destinations.

I. C. C. No. 6317—Pittsburgh & Southwestern Coal Co. vs. Wabash-Pittsburgh Terminal Ry. Co.

Combination carload rates on bituminous coal from points on the Wabash-Pittsburgh Terminal Ry. in Pennsylvania to destinations in other states on and reached via the Pittsburgh & Lake Erie R.R. and the Baltimore & Ohio R.R. found to be unreasonable and unduly prejudiced to complainants to the extent that they exceed by more than 10c. per ton joint carload rates on bituminous coal for hauls to same destinations from mines on the West Side Belt. Defendants required to establish joint rates from points on the Wabash-Pittsburgh Terminal Ry. which shall not exceed by

more than 10c. per ton the rates to same destinations from points on the West Side Belt R.R.

I. C. C. No. 5604—Weatherford Chamber of Commerce vs. Missouri, Kansas & Texas Ry.

Existing carload rates of \$2.50 per ton on lump coal and \$1.70 per ton on slack coal from mines in Oklahoma and western Arkansas to Weatherford, Tex., held unjust and discriminatory, and rates not to exceed \$2.25 per ton on lump and \$1.65 on slack coal established.

FOREIGN MARKETS

GREAT BRITAIN

Market fairly active. Shortage of vessel tonnage causes heavy accumulation of export coal. War relief measures.

The London coal market is fairly brisk, especially for the better qualities of household fuel. The colder weather has stimulated the demand, but the enormous arrivals of Yorkshire and Lancashire coal (usually absorbed in the export trade) have kept prices low.

Scarcity of tonnage, due to the unwillingness of shipowners to risk their ships in the mined area of the North Sea, continues to act as a deterrent to trade, though, perhaps, to a lesser degree than last week. Financial difficulties are gradually being overcome, and war risk rates have eased slightly in consequence of increasing confidence in our overseas trade.

Coal exports have been prohibited by the Australian Commonwealth.

The Miners' Federation of Great Britain have postponed their annual conference owing to the war, but there is to be a conference to elect officials and discuss necessary details on Oct. 27 in London.

A circular has been issued by the Government Committee on the Prevention and Relief of Distress, drawing the attention of the local representative committees acting for the City of London and the Metropolitan area, to the offer made by Sir Arthur Markham and certain coal merchants to deliver coal to the needy at stipulated maximum prices.—"The Colliery Guardian."

GERMANY

Supplies less plentiful. Byproduct plants working full in order to provide benzol. Mines operating at a loss.

It is becoming more and more evident, with the approach of winter, that the German householder will have a hard time in securing his coal. The car shortage has improved until the transportation facilities have reached about 66% normal and the Syndicate deliveries are now 50% normal for coal and 25% for coke, but there are no indications that these figures will be bettered. All the lump and steam sizes are taken at once for the navy and the railways and the industries engaged in producing war materials.

Deliveries drag in gas-making coals, in spite of the pressing demand, as the pits cannot increase their production because of the shortage of miners. The operators are also forced to coke more coal than the demand justifies in order to furnish benzol, a byproduct of great military importance just now. At the request of the Coal Syndicate, the minister of commerce has issued a circular to all the chambers of commerce in the empire, strongly recommending the increased use of coke for domestic purposes, and the minister of railways has contracted for 100,000 tons of coke at a reduction of 85c. per ton. Although the coke prices have not been advanced, it is thought that they are still too high and that a material reduction should be made to ease the situation.

In spite of higher coal prices, the operators will be more than satisfied if they are able to meet the greatly increased expense account with nothing more serious than a loss of profits. Undoubtedly, many will have to work at a serious loss.—Translated from the "Frankfurter Zeitung."

GREECE

During the year 1912 there were imported into Greece 482,768 short tons of coal, of which Great Britain supplied 354,996 tons, Germany 115,035, the rest coming from Turkey, Belgium, and the Netherlands. The total imports for 1911 were 639,822 short tons. The estimated figures for 1913 show a rapid recovery from last year, the imports into the port of Piraeus for the 12 months being 665,000 tons, including steam and gas coal, patent fuel, etc. Of this amount Germany sent about 100,000 tons, the remainder coming from England. Of the above amount perhaps 450,000 tons were taken out of the country as bunker coal. Coaling stations in the Islands of Zea and Syra received 140,000 tons, most of which was later supplied to ships calling for coal. "Daily Consular and Trade Reports."